THE

AMERICAN JOURNAL OF PHARMACY.

ART. LII.—ON THE CHLORIDE OF ZINC.

By Edward Parrish.

ATTENTION having recently been directed to the chloride of zinc, as a disinfecting agent especially suited to the purposes of the practical anatomist, I was called upon to supply a solution suitable for preserving subjects in the dissecting room. This chloride, prepared according to the United States Pharmacopœia, though a beautiful article, is necessarily an expensive one, and is liable to other objections in view of the use proposed. In attempting its solution, a white precipitate is generally separated, which is insoluble except by the addition of an acid; this consists of an oxychloride occasioned by the high heat used in fusing it. The chloride is also liable to the objection of being exceedingly deliquescent, and therefore difficult to preserve in the solid form, unless completely protected from the air, and from the same cause and its corrosive properties is very troublesome to those who have occasion to manipulate with it.

To obviate these difficulties, a solution was formed directly from the zinc and hydro-chloric acid, which, while it possesses sufficient purity for the purpose, has the advantage of cheapness and convenience of preparation.

The following is the formula I have used in preparing the solution:

Take of granulated zinc 1 pound (av.)

"   Hydro-chloric acid, 4 pounds, or a sufficient quantity.

"   Water, 2 gallons and 2 pints.

Add successive portions of the acid to the zinc in a glass or porcelain dish, until it is dissolved, taking care that the acid is not in excess, then strain through a coarse linen cloth, and add the water.

This solution contains about 1 part of the chloride in 1º, which is believed to be the maximum strength required. It is a transparent, colourless liquid, of the sp. gr. 1.090. It has been found to diminish and generally to arrest decomposition even in very offensive subjects, and to destroy, to a great extent, the effluvia so generally proceeding from them. When it is desirable to keep a concentrated solution for the preparation of the above extemporaneously, the addition of the water, as prescribed in the formula, may be dispensed with, the first product being retained. This is a transparent liquid, of a light straw colour, having the sp. gravity of 1.579. It is highly charged with the caustic properties of the chloride, and would be suited to many purposes of the physician, though owing to the impurities existing in commercial zinc and acid, it should not be used as an internal remedy without the proper precautions to insure its purity. The addition of a gallon of water to every pint of this solution, will make a liquid corresponding to that recommended for anatomical purposes.

ART. LIII.—ON A NEW PROCESS FOR THE PREPARATION OF VALERIANATE OF ZINC. Suggested by M. Brun-Buisson, and perfected by M. J. Lefort of Gannat.

Since the great number of observations that have been directed to the best manner of preparing valerianic acid with a view to medicine, much light has been thrown upon the subject, and it has been satisfactorily shown that this acid is a result of the oxidation of the volatile oil.

M. Gerhardt was the first to observe that the volatile oil of valerian, when exposed to the air, gave valerianic acid. Taking advantage of this hint, M. Brun-Buisson ascertained that when the distilled water of valerian was exposed to the air for a month it yielded a much larger product of the zinc salt than when saturated immediately after distillation, and that a kilogramme (about 2½ lbs.) of valerian would yield sufficient acid for 15 grammes (3¾ drachms) of valerianate of zinc.

M. Lefort observes* that he had on several occasions repeated the suggestion of M. Brun-Buisson, and obtained similar results, and it occurred to him that a more rapid mode of oxidizing the volatile oil might be resorted to than exposure to the air, which was satisfactorily proven by the result of the following process:

Take of Valerian root (as recent as possible) 100 pts. or oz.
"   Water,   -   -   -   -   -   -   500 "
"   Sulphuric acid,   -   -   -   -   10 "
"   Bichromate of potassa,   -   -   -   6 "

The valerian in coarse powder was macerated for twenty-four hours in the water to which had been previously added the bichromate and sulphuric acid, in the boiler of the alembic, when the distillation was commenced. The first

* Jour. de Pharm. et de Chimie, tome X., p. 194.

fourth of the distillate was returned to the still, as it contained considerable volatile oil—after which the process was continued until the distilled water ceased to redden litmus paper.

The product of the distillation is then placed in a porcelain dish, or better, in a large matrass, and an excess of hydrated carbonate of zinc (which is ascertained to be free from iron) is added. The mixture is allowed to digest at a temperature of 190 degrees, Fahr., during two or three hours on a sand bath, until saturated. The liquor is then filtered and evaporated over a naked fire till reduced to 50 parts (oz.), when it is placed on plates and the evaporation allowed to proceed gradually to dryness in a drying room, or by any other means at a moderate temperature.

By this process M. Lefort obtained at three different operations, 17, 18, and $18\frac{1}{2}$ parts of valerianate of zinc from 1000 parts of valerian root, a much larger yield than any process before tried has afforded.

It is desirable, in operating on valerian root, that it should be as freshly dried as possible, because the acid and oil are sensibly diminished in quantity by age. It is probable, however, that the relative amount of valerianic acid is greater in old than in the recent root, owing to the action of the air on the oil.

I have never been able to obtain more than 35 grains of valerianate of zinc from a pound of the root by the ordinary method of saturating the distilled water, whilst this process yields 126 grains, nearly four times as much. This difference is no doubt due in part to M. Lefort's valerian being fresher, but chiefly to his new method of manipulating.

There is a distilled water of valerian officinal in the French Codex, which is made by distilling one part of valerian with six parts of water, until four parts are obtained. This water, by standing, becomes more medicinal and permanent, and there is little doubt that it contains the chief vir-

tues of the root, and merits the attention of our practitioners. It is easily prepared, and by M. Lefort's method twice as strong as by simple distillation—and would present the drug in a form very eligible for prescription, and vastly better and more uniform than the infusion. It would probably form an admirable combination with syrup of wild cherry bark, or as a menstruum for that bark, in certain dyspeptic cases accompanied by nervous excitement and irregular action of the heart.   **W. P. Jr.**

ART. LIV.—PROCEEDINGS OF THE NEW YORK COLLEGE OF PHARMACY.

At a stated meeting of the Board of Trustees of the College of Pharmacy of the city of New York, held September 3d, 1846, John Milhau, first Vice President, addressed the Board as follows :

Gentlemen,—I would be doing injustice to my feelings were I not to beg your indulgence for a few remarks commemorative of the valuable services rendered to this College by our late venerated President, whom it has always been our delight to associate with in promoting its best interests.

In his death every one of us has to deplore the loss of a friend ever ready to impart most cheerfully the useful knowledge which diligent study and well matured experience had secured to a mind of superior cast.

His loss to us is irretrievable, and will be felt most deeply not only by his immediate friends, but likewise by the profession and the community at large.

The scrupulous care bestowed by him in the selection of pure articles for the dispensing department of his business

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enabled him but too often to detect most culpable adulterations of drugs and chemicals. Many are the instances in which sophisticated articles have been returned to the owners with such remarks from our late worthy President as would teach them he was too competent and vigilant a sentinel ever to allow their nefarious speculations to succeed in this great drug mart.

His zeal and industry in the advancement of all that could possibly benefit the science of Pharmacy, would have done credit to one much younger, but above all his example in the prosecution of his professional duties should be held up as worthy of imitation: ever conscious of the importance of personal attendance to the faithful discharge of the tedious and but ill-requited and little-honoured duties of a practical Pharmaceutist, he allowed himself no respite.

In the long course of my life I have no where known an individual who united in a more eminent degree all the qualifications requisite to form an apothecary; he was honest, virtuous, intelligent and indefatigably industrious; he inspired confidence in all who approached him. The poor as well as the rich were equally grateful to him; the first, because they were the objects of the kindest benevolence; and the latter, that the gentleman, the scholar, and the skilful manipulator should condescend to attend to the minutiæ of so delicate, and at the same time so tedious a calling.

He has left a numerous and interesting family to mourn his loss. One of his sons has already done himself credit as a distinguished graduate of this institution, and promises to sustain the fair name he has inherited.

It will now be requisite, gentlemen, that we should all unite in our endeavours to diminish, as much as possible the immense loss we have sustained in the demise of so good, so virtuous, and so useful a man as the late Constantine Adamson.

Mr. George D. Coggeshall then made some appropriate

remarks on the character of the deceased, after which he offered the following resolutions, which were unanimously adopted:

Resolved, That in the death of our late President, Constantine Adamson, a great public calamity has been sustained, which has fallen with especial weight upon this College, and that we, so lately his associates, have been stricken with deep sorrow at his removal, as by the loss of one of our first members, eleven years our President, always conspicuous for his faithfulness, devoted zeal and efficiency, and yet more because of the profound respect we entertained for his counsel, the admiration, and warm personal regard in which we held his high integrity and his estimable social qualities.

Resolved, That his loss, great as it is to us, must be to his family a much deeper and more painful affliction; that we offer our sympathy, not merely in form and compliance with custom, but as sincere mourners with them, under a blow which, from their privilege of closer connexion, it is their greater affliction to feel.

Resolved, That a committee of three be appointed to collect materials for, and prepare a memorial of his life and services, to be read before the College at its stated meeting in November.

Resolved, That a copy of these resolutions, duly signed by the officers of the meeting, be presented by the committee above mentioned, to the family of Mr. Adamson.

It was, on motion,

Resolved, That a copy of the chairman's address be also presented to the family.

MEMOIR OF CONSTANTINE ADAMSON,

Late President of the College of Pharmacy, of the city of New York.

Read before a meeting of the College, November 24th, 1846.

CONSTANTINE ADAMSON, the son of Cuthbert Adamson, was born at New-Castle-upon-Tyne, England, September 11th, 1784. He went into the army at the age of 17 or 18; and in consequence of hard service in Flanders, he contracted a severe inflammation of the lungs, which induced him to procure a furlough and return home. His father being a captain in the navy, he went to sea with him, where his health became again established.

On his return from sea, he took a situation in a Drug store at Hull. To this business he appears to have been attached, and here he served his apprenticeship. Wishing to better his condition, or perhaps having a desire to travel, he came to Pictou, Nova Scotia, in the spring of 1810. He returned to England for a short time, and again to Nova Scotia. He soon after appears to have resumed the military profession, as we find that he was a major in the provincial army during the war from 1812 to 1815. About the same time he entered into the lumber trade, and made large shipments of this article to England, but in consequence of a great falling off in the price of lumber, on the return of peace, he lost the capital he had brought with him and embarked in that business. Having married in the mean time, and finding himself with a family growing up around him, and his means greatly reduced, he was under the necessity of giving up an elegant style of living and favourite sports, and turn his attention seriously to providing a livelihood for himself and family. With this view he came to the city of New York in April 1817, and commenced teaching; but was soon after attacked with inflammatory rheumatism, which lasted several months and made it necessary for him to give up his school. He was attended by Dr. Richard Seaman, of

the firm of "Walters & Seaman," during his illness. About this time Walters & Seaman failed in business, and Mr. Adamson, on his recovery, was induced to take charge of the store, which was at the corner of Chatham and Doyer streets. The business was resuscitated by the assistance of Dr. Walters' friends, and Mr. Adamson continued with him.

On the death of Dr. Walters, which occurred soon after, a druggist of extensive business in this city offered to set Mr. Adamson up in business, and to furnish the requisite stock of goods and funds for that purpose. This generous offer, however, Mr. Adamson declined, alleging that he thought himself under obligations to Dr. Walters, who had befriended him, and he therefore resolved to continue the business for the benefit of his widow and children.

In the spring of 1829 the business was removed to No. 6 Bowery, remaining under the charge of Mr. Adamson, and was managed by him with great economy and success for several years, until the amount advanced by Dr. Walters' friends had been repaid them from the proceeds of the store, and a fund accumulated for the benefit of his family. Mr. Adamson then purchased the store from Dr. Walters' friends, and went into partnership with Dr. William J. Olliff, under the firm of "Adamson & Olliff." A few years since they opened a branch store at the corner of Broadway and Fourth street, where Mr. Adamson removed with his family, and where he resided until his death.

His store became the resort of physicians of his vicinity, who, with great reason, placed entire reliance on the quality of his materials, and the skill, ability, and exactness of their preparation. His knowledge of new remedies,—the fruit of unremitting study,—and of the chemical and pharmaceutical character of their combinations, had inspired the most cautious and scientific prescribers with entire confidence. His knowledge kept pace with the progress of science, and up to the day he was removed to a sick bed,

he was careful to be thoroughly furnished for his responsible and arduous profession.

Mr. Adamson appears from early life to have been diligent in acquiring information. He had a fair knowledge of Greek, Latin, and most of the modern European languages; he uniformly spent a portion of the evening in scientific studies, and inquiry into branches of knowledge interesting to him. Having a retentive memory, he amassed an extensive knowledge of science, history, and general literature. He was a good physiologist and pathologist; and was often consulted by physicians who frequented his store, on questions which they found it difficult to gain the requisite assistance from their own branch of the medical profession. To all who sought information of him, his counsel and instruction were freely given; not with the ostentatious assumption of superior attainments, but with the simplicity of a child and the kindness of a friend; stating with frankness the sources of his information, and his own opinion thereon. He was ever ready to impart most cheerfully, the knowledge which his diligent study and well matured experience had secured to a mind of superior cast. He was ever on the alert to detect fraudulent and sophisticated articles, whether manufactured at home, or imported from abroad; and by his acuteness and knowledge has repeatedly prevented drugs of this character from being vended and used in this country. Nothing appeared to escape the vigilance of his active mind.

Mr. Adamson was an alien. He remained so from his upright sense of honor. Having lived in his native country till middle life, and having received a commision as an officer in its army, taking, on that occasion, the customary oath, he was under the impression that he could not conscientiously, (although he had great respect for our laws,) forswear his allegiance to his own land.

He took an active part in the original formation of the College of Pharmacy in this city. He was elected a member of the

first Board of Trustees, March 25, 1829. He was elected a Vice President, March 16, 1831, and President March 20, 1835. Since his first election as President of this College, such was the satisfaction that he gave in the fulfilment of his office, and the affection with which he was regarded by the members, that he was uniformly re-elected by a unanimous vote. On several occasions he declined, or attempted to decline a re-election, but at the earnest solicitation of the members, consented to fill the office till the day of his death. From the first institution of this College, he was remarkable for an untiring devotion to its interests. In all weathers he was one of the first at his post, at the meetings of the College, of the Board of Trustees, and of committees. On these occasions, as in his every day intercourse with his friends, he was the chief point of attraction, not only from his accurate knowledge of the business in hand, but on account of his extensive general information, and cheerful courteous manners.

On Saturday the 15th of August, he was taken with a severe inflammation of the bowels, in consequence of hernia, with which he had been long troubled. Notwithstanding the exertions of the best medical talent of our city, the inflammation progressed rapidly. Finding his end approaching, he laid himself down to his last sleep with the calmness of a philosopher, and the confidence of a conscientious and upright Christian, having the fullest reliance on the goodness and mercy of his God. He expired quietly and calmly, with his family and friends around him, on Monday the 17th of August, 1846.

In his death this community has lost one of its most useful citizens, and the College of Pharmacy one of its most able and indefatigable members. He was a kind husband and father, a highly respectable member of society, a faithful friend, and an upright man. May his example be kept in mind by those who had the happiness of knowing him, to stimulate them in the path of duty and usefulness.

Proceedings of the Board of Trustees of the New York College of Pharmacy in reference to an adulteration of Iodide of Potassium.

At a meeting of the College of Pharmacy of the city of New York, held 24th November, 1846, upon reading the minutes of the Board of Trustees, it was

Resolved, that the letter received from Messrs. Haskell & Merrick, by the Board of Trustees at the meeting of the 5th instant, respecting the article purporting to be Iodide of Potassium, with the report of the committee of inspection on the subject, be offered to the American Journal of Pharmacy for publication.

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By order of the College,
JOHN MEAKIM, Secretary.

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To the Trustees of the College of Pharmacy of the city of New York.

Gentlemen:—We deem it our duty to lay before your body a statement of facts, which we trust will not be uninteresting, or without its good effects.

On the 22d August of the present year, we purchased of the house of Messrs. Carnes & Haskell of this city, $11\frac{3}{4}$ pounds of an article purporting to be Hydriodate of Potassa, with the label on each package of " H. S. Carnes, 14 Rue Neuve St. Nicholas à Paris." The general appearance of the article was much in its favor, being white and in handsome crystals, resembling those of the Iodide of Potassium. We were induced, however, a few weeks since, to put a portion of the above into the hands of Mr. Edward N. Kent, an analytical chemist of this city, for analysis. On trial he discovered no trace of Iodine, but that it was essentially Bromide of Potassium. To this communication we adjoin one from Mr. Kent, giving the result of his analysis. From the acknowledged high standing and integrity of the importers, Messrs. Carnes & Haskell, we feel assured that this article was sold to us in good faith, and that these gentle-

men will be enabled to explain the transaction to the satisfaction of all.

<div align="right">We remain with respect yours,</div>

<div align="right">HASKELL & MERRICK.</div>

REPORT

Of the Committee of Inspection to the Board of Trustees.
Read and accepted 19th of November, 1846.

The Committee of Inspection to whom was referred for examination, an article purporting to be Iodide of Potassium, but which was supposed to be a sophistication, respectfully report,

That in the presence of the Professor of Chemistry, whose valuable aid is always ready upon such occasions, this committee made the following minutes of the package submitted, and the experiments upon its contents.

It was in an ounce wide-mouth vial, of French pattern and appearance, cork stopped, and labelled on green paper, "H. S. CARNES, Produits Chimiques et Pharmaceutiques, 1 oz. Hyd. Potass. 14 bis, Rue Neuve St. Nicholas à Paris," and sealed "H. S. C." (in old English letters,) "Paris," (in Roman letters under the first,) on black wax covering the top of the vial.

The article, in general appearance and shape of crystals, exactly resembles Iodide of Potassium. The taste is like that of common salt, but a little more pungent.

It is readily soluble in water, though it appears to require a much larger proportion than effects a solution of the Iodide, probably as much as three parts, but this point was not accurately ascertained. With acetate of lead it threw down a heavy white precipitate.

Sulphuric acid poured upon it in a bent tube produced a brisk effervescence, and at first an evolution of heavy reddish orange fumes, which could be poured out, and fell

down in the air. The effervescence continued after the fumes had disappeared.

The solution treated with starch and sulphuric acid, presented a reddish orange colour.

From these experiments, each of which was tried in comparison with a portion of Iodide of Potassium of known purity, the suspected article was judged to be Bromide of Potassium, and to decide this, Mr. Reid proposed to examine it quantitatively by means of sulphuric acid. As this proceeding required considerable time, the matter was left in his hands. He informs the committee that the substance was treated with sulphuric acid, and converted into supersulphate of Potassa. The excess of acid was neutralized with bi-carbonate of Potassa, the amount of which was carefully noted, and the sulphate it would form deducted from the whole, the remaining sulphate indicated the equivalent of sulphate of Potassa that Bromide of Potassium would give. The conclusion is, therefore, that the substance examined is Bromide of Potassium.

Respectfully submitted,

Signed. {
GEORGE D. COGGESHALL,
JOHN H. CURRIE,
WILLIAM HEGEMAN,
Committee.

New York, November 19th, 1846.

ART. LV.—ON AN IMPROVED DRUG MILL.

Invented by BERIAH SWIFT.

OUR attention has been recently called to an improved porta-
ble mill, designed for the use of druggists and apothecaries in
grinding drugs for the purposes of decoction, infusion or dis-
placement. "The superiority of this mill consists in the grind-
ing surfaces of the plates being cut into circular rows of teeth,
concentric with the plate, and so arranged that the teeth of one
plate extend between the rows of teeth of the other plate, by which
the extent of grinding surface is greatly increased beyond what
it would otherwise be." The larger teeth have a claw shape,
which enables them to draw in and crush much larger masses
than those we have heretofore examined. The hopper is con-
structed of cast iron, and firmly attached in its place by a screw
bolt and nut. The chief advantage of this class of mills, and
this one especially, is that it will readily, with comparatively

little labour, reduce dry drugs, as roots, barks, seeds, and even leaves, to a state of division fit for the action of liquids, by displacement. Senega, Ipecac, Blood-root, and other irritating substances which give much trouble in a mortar, are comminuted with ease and dispatch. As the proximity of the grinding plates can be regulated by an arrangement attached to the back plate of the mill, the fineness of the powder can be controlled to suit the character of the drug, and the particles are much more uniform than when obtained by contusion.

Though not designed to supersede the mortar and other instruments for making fine powders, yet many friable substances, by passing and re-passing several times, afford a large proportion of powder by means of a sieve. It should be understood that when tough roots or bark are to be treated, that the plates should be at first wide apart.

. We have tried the mill with a variety of drugs, such as Colombo, Gentian, Rhatany, Senega, Fennel-seed, Sarsaparilla, Liquorice-root, Bitter-sweet, &c., and can say it leaves little to be desired. Its success, however, requires that the substances be *dry*, and when fibrous, like Sarsaparilla and Liquorice, that they be previously cut in short lengths.

The price of the mill places it within the reach of most druggists and apothecaries, and as "time is money," when the demand for its services is considered, it will save its cost in one year. The mill can be seen at Charles Ellis & Co.'s, who are agents for this city, or at A. B. & D. Sands, of New York, who, we are informed, are the general agents for the proprietor, Beriah Swift.   W. P. Jr.

ART. LVI.—ON SOPHISTICATIONS OF SULPHATE OF QUINIA AND BLUE MASS.

By William Procter, Jr.

THE boldness with which the adulteration of medicines is carried on could hardly be believed, were it not for the occasional revelations which occur from time to time, either through the vigilance of some members of our profession, or the accidental concurrence of circumstances. The following letter to my friend E. Durand, enclosing a sample of a white crystalline substance, which he believes to be salicin, was handed to me for examination.

SAVANNAH, October 5th, 1846.

Mr. E. DURAND:

Dear Sir,—I enclose you a sample of an article sold here as quinia; is it or is it not? I am under the impression it is salicin. It has been sold in considerable quantities at a reduced price, which led me to suspect it. The label is Pelletier & Delondre.

Your answer to the above will oblige

Yours, truly,   Jos. M. TURNER.

The substance referred to above, has the following characteristics. It is white, crystalline, inodorous, fusible by heat, and entirely combustible, has a bitter taste accompanied by the peculiar flavour of willow bark, is decomposed by sulphuric acid, which is coloured intensely red by it, is readily soluble in water and alcohol, and when distilled along with a mixture of bichromate of potassa and sulphuric acid a liquid is obtained which is turned purple by the per salts of iron, has the odour of teaberry oil, and other properties of a solution of hyduret of salicyle. Its solution is not precipitated by nitrate of baryta or tannic acid.

From these results the substance in question does not contain sulphate of quinia, but is identical with salicin,

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which principle it undoubtedly is, as supposed by the writer of the above letter.

That salicin should be admixed with quinine is not new, but to be entirely substituted for it, as in this instance, is a matter of surprise, as its greater solubility will at once detect it.   I have been informed that large quantities of salicin have been received from Europe, which, as its use is very limited, may probably be designed for the sophistication of quinine.

Blue Mass.—A sample of blue pill mass was handed to me by Charles Ellis, with the statement that several hundred pounds of the same, as he was informed when on a recent visit to New York, had been imported from a house in England, and was now lying at the New York Custom House, ready to be imposed on the medical community. The sample presented the following characters.   It had a greenish lead colour, coarse texture, without any odour of conserve of roses, and had a specific gravity of 1.777; enuine blue mass being about 2.051.

Fifty grains of it mixed with a portion of iron filings was rolled into pellets, and introduced into a glass bulb attached to a tube, which latter was bent and inserted through the cork of a bottle, and into a portion of alcohol, as recommended by M. M. Smith and Bridges, (see vol. 17 of this journal.)   After the volatile products were collected in the vessel of alcohol, and the mercury well washed, it was found to weigh rather less than four grains, being about 7.75 per cent, or less than one-fourth of the true proportion.

Another portion of the mass was heated in the flame of a blow-pipe, until all the combustible matter was consumed, and was found to retain nearly its original shape.   This residue had a brownish yellow colour, gritty feel when crushed under a spatula, and amounted to 24 per cent. of the blue mass burnt.   It has been stated that blue slate in powder has been used in England, to adulterate this medicine, replacing the absent mercury by it.   Now by adding

7.75 per cent. the quantity of mercury obtained, to 24 per cent of this incombustible residue, we have about 32 per cent. of the mass, very near the amount that should have been constituted of mercury.

The article is put up in one pound jars, of an extra large size, covered, and labelled "Blue Pill," with English arms, without any maker's name. It is said to be in charge of an individual who is agent for an establishment at New-Castle-on-Tyne, England.

Our New York friends deserve credit for their acuteness and success in detecting these foreign adulterated preparations, and it is only to be regretted in this instance that the true origin of the imposition is not known, that the authors of it might be visited by that severity of rebuke of which such nefarious practices render them deserving.

ART. LVII.—EXPERIMENTS ON SARSAPARILLA.
By W. S. W. Ruschenberger.

Some months since, with a view of comparing the value of varieties of sarsaparilla in the market, I caused the following experiments to be made by Wm. St. Clair Nichols, then the apothecary of the institution.

One pound of Para sarsaparilla was macerated in thirty-two ounces of alcohol, placed in an apparatus for displacement, and treated with dilute alcohol until thirty-two ounces were obtained. The liquid was of a clear bright colour, rather deeper than that of Madeira wine, but of the same hue. It possessed the peculiar taste of sarsaparilla. The displacement by dilute alcohol was continued, and on mixing the displaced fluids, a copious precipitate was formed,

which was of a dark colour, glutinous, adhesive, insoluble in alcohol, but soluble in water.   The dilute alcoholic menstruum was of a darker, richer taste, and had the peculiar taste of the root.   The liquid was carefully evaporated by means of a sand bath at a temperature not exceeding 180° F., and two ounces (avoirdupois) of solid extract obtained. This extract is of a shining black colour, possessing the acridity and distinctive properties of pure sarsaparilla.

One pound of Vera Cruz sarsaparilla, treated in the same manner, yielded two and a quarter ounces (avoirdupois) of solid extract, somewhat inferior to the Para variety.

One pound of Honduras sarsaparilla, treated in a similar manner, yielded two and a half ounces (avoirdupois) of solid extract inferior in quality to that of either the other varieties.

At the time no other varieties of sarsaparilla were at hand. Recently, however, Mr. Thomas S. Wiegand, at present the apothecary of the institution, treated one pound of Rio Negro sarsaparilla, in the same manner, and obtained fou. ounces and twenty grains (avoirdupois) of solid extract, equal or nearly equal to that obtained from the Para varity.

The result of these trials may be stated thus:
Sarsaparilla from Rio Negro, oz. 4, 20 grains solid extract.
          "   "   Honduras, " 2½.
          "   "   Vera Cruz, " 2¼.
          "   "   Para,   " 2.

My own impression from these experiments is that the Para sarsaparilla is the best, the Rio Negro second, the Vera Cruz third, and the Honduras the least valuable of the four varieties.   Possibly the subject may be worth further examination by those interested in the manufacture of the various preparations of sarsaparilla.

U. S. Naval Hospital, N. Y. Sept. 12th, 1846.

REVIEW.

ART. LVIII.—A MANUAL OF MATERIA MEDICA AND THERA-
PEUTICS, INCLUDING THE PREPARATIONS OF THE PHAR-
MACOPŒIAS OF LONDON, EDINBURG, AND DUBLIN,
WITH MANY NEW MEDICINES. By J. Forbes Royle, M. D.,
F. R. S., &c., Prof. of Mat. Med. and Therapeutics, Kings College,
London, 1847.

THE author of this Manual has for some time been be-
fore the public as a laborious and thoroughly scientific cul-
tivator of the department of Materia Medica. His "Essay
on the Antiquity of Hindoo Medicine," and "Illustrations
of Himalayan Botany," have given to him a high standing
on the list of savans, and the present treatise, which contains
much of the lore accumulated while in India, has demon-
strated how well fitted he has rendered himself to illustrate
the subject to which it is devoted. From the general exe-
cution of the work, its completeness with respect to Ma-
teria Medica proper, although in a condensed form, the
great amount of new and most interesting matter contained
in it, and the admirable arrangement; one would suppose
that no apology were necessary for its appearance; yet the
author has conceived that some explanation was proper.
In his preface he states that it was undertaken at the re-
quest of his intelligent publisher, who may be supposed to
be well acquainted with the wants of the Profession. This
alone, however, would not have been sufficient to have in-
duced the author to undertake the work, had he not also been
aware, "from the complaint of pupils, and convinced from
his experience as a teacher, that the student of Materia
Medica required something systematic to study, which,
brought up to the present time, should be sufficiently full
for information, and yet as short and condensed as was
compatible with the avoidance of being superficial." An-

other object which influenced him was in a measure to do away with the difficulties arising to students from attendance upon lectures on Materia Medica, during the first course, "before they have become acquainted with Chemistry," and while they are ignorant of Botany, and have just begun their attendance on Physiology, preparatory to a study of the nature and treatment of disease.

The work may be divided into eight parts, each of which is distinctly set forth. These are—Operations of Pharmacy, Pharmaceutical Chemistry, Mineral Materia Medica, Vegetable Materia Medica, Medicinal Plants from Ranunculaceæ to Fungi, Products of Fermentation, Animal Materia Medica, and Physiological and Therapeutical arrangement of the Materia Medica. All of these will afford material for comment, and the expression of such remarks as may be suggested by the text.

Under the head of "Operations of Pharmacy," is contained a brief summary of the operations employed, in the preparation of medicinal substances for use in the appropriate form. Such a chapter must be useful, by familiarizing the mind of the student at the outset, with the various modes of preparation, and the terms by which they are expressed. In few other works not strictly pharmaceutical are they contained. In connection with this information is presented the subject of crystallization, with the primitive forms of crystals, sufficiently extensive for beginners, and which may be advantageously followed by the study of the luminous chapter on this topic, in Pereira's large work.

The chapter on pharmaceutic chemistry is excellent, as it is a clear and distinct exposition of the information pertaining to Elements, Chemical Analysis, Synthesis, Proximate and Ultimate Principles, Combinations, the Atomic Theory, Theory of Volumes, Nomenclature, and lastly the employment of Symbols. This last is most important to students, from the universality of their use and the convenience arising from their employment. With the excep-

tion of a paper on the subject by Dr. Bridges, in a former number of this Journal, no other short, easy, and intelligible summary of all the points involved in the construction of this Berzelian language of Chemistry has appeared.

In treating of the Inorganic kingdom, the author has adopted a simple but useful arrangement. Commencing with the atmosphere, he proceeds to take up its elements, and in turn those of water ; after which follow in succession the various simple products and their combinations. In this way are discussed the whole Inorganic Materia Medica. At the conclusion of each body or substance, are given its modes of application to the purposes of medicine, and the preparations, either simple or combined, resulting from pharmaceutic science. The important addition of tests, incompatibles, and adulterations, is sufficiently made, to aid in the study of this class of articles, or to assist the experimenter when reference is needed. Each article is headed by the names used in the Pharmacopœias of the three British colleges, and in passing, we may remark that the pharmacy of Great Britain still labours under the difficulties of a diverse system of pharmaceutic momenclature, which must exist until some single standard of general authority shall prevail.

The consideration of the Vegetable Materia Medica is premised by a chapter on Botany. It includes descriptive and organic Botany, classification, vegetable Physiology, and as appropriately associated with these, the chemical elements, geographical source, medical properties of families of plants, and the mode of collecting and drying vegetable substances. This portion of the work might be appropriately extended. As it is, however, an outline is presented of the divisions mentioned, which will answer the purpose of an introduction to the subject, and at the same time inculcate its importance to the pharmaceutist and physician.

We have always thought that habit, and the difficulty of obtaining ready access to books from which leading elementary knowledge could be obtained, are the causes that Medical

Botany is slighted ; more especially in this country, where it is not a portion of the regular course of instruction. Certainly it is not to be attributed to any defect in the branch itself, which is both attractive and serviceable. The department of Materia Medica without it would be defective; and every treatise which pretends to scientific precision has more or less reference to it. If we take up a Dispensary, or work like the present, and turn to the account of vegetable substances, a large portion will be found devoted to the description of plants from which they are derived, in language strictly technical. To one unacquainted with the key, which is a comprehension of the botanical alphabet, or in other words the elementary principles of the branch, this portion of the very text books of Materia Medica must remain sealed, a dead letter, to be read only by the initiated ; the yearning to unravel which could be easily gratified by a small degree of preliminary botanical information.

It may be thought, however, to be a mere accessory, more ornamental than useful. To this we would reply, that the physician and pharmaceutist have each, under circumstances of difficulty, to apply to the botanist to extricate him from his dilemma, as for instance in the substitution of one substance for another, adulterations, &c. Materia Medica has in a great measure been advanced to its present state by the researches of botanists, and improvement would be greatly restricted without its aid. To study it then is not only important, but essential to one thoroughly educated. The present age is one of teaching by illustration; lecturers no longer endeavour to impress the mind with incomprehensible, dry details, when by proper demonstration, information can be easily and certainly communicated, and in the study of this science, of the advantages of which we are strongly convinced, facilities in the way of improvement are becoming more numerous. A medical botany by Dr. Griffith is now in press, a work much required in the United States, and other publications are promised. In the work now under consideration, the illustrations which far exceed

in excellence any in similar treatises, are not among its least merits. The arrangement adopted by Dr. Royle is a botanical one. The great reformer of botany, Linnæus, made an effort to arrange the Materia Medica upon this plan, and his essay was conclusive as to its feasibility. Similar ideas had been entertained, as for instance by Camerarius, but the knowledge was wanting for its extensive development. The natural system of Jussieu presented an admirable opportunity of engrafting upon it the most natural classification of vegetable substances, employed in medicine, and of exhibiting, that similarity of properties and virtues are so closely allied to structure and organization as to be inseparable. The eminent expounder of this system, De Candolle, has fully acomplished the task, and if not the originator of the arrangement, most undoubtedly possesses the merit of carrying it out, with so much perspicuity and convincing detail, as to have established its superiority. His " Essay on the Medical Properties of Plants," is only one of many philosophic works, equally stamped with truth and reason, emanating from his pen; and every pharmacologist should be familiar with its principles. In this system chemistry is the handmaid of botany, and advanced as the former branch has been since the year 1816, when the second edition of the essay was published, the light of experiment and research have only further confirmed his labours. This the author lived to see and to enjoy. Let us take one or two examples as illustrating the statement that has been made. The *Solaneæ* of Jussieu, or *Leuridæ*, Lin., presented a marked resemblance in botanical characters and habit, so as to lead to their being grouped in a family; the family likeness being strong, the family traits were equally striking, as they possessed deleterious properties. This was as far as De Candolle could trace the resemblance; but chemistry has exhibited that the bond is further cemented, by the discovery of an alkaloid principle in most of the articles, which discovery was foreshadowed to Vauquelin,

with espect to Belladonna, when he stated that the delete-
rious principle of this plant is "a bitter and nauseous matter,
soluble in spirits of wine, forming with tannin an *insoluble*
combination, and furnishing ammonia from its decomposi-
tion by fire."

Another striking illustration of the position, that the ad-
vance of chemical discovery has still further confirmed the
propriety and advantage of grouping vegetable substances,
in accordance with a botanical arrangement, is derived
from the *Rosaceæ.* This order, according to Jussieu, was
an extended one. If the whole order be taken, some di-
versity of formation and products will be apparent; but it
admits of subdivision in which exact analogy is maintained.
In addition to the lines which botanical investigation has
drawn around these subdivisions, chemical investigation
has determined the source and principle of the activity of
the individual species belonging to them to be one and the
same. Thus taking ROSACEÆ as the order, we find the
Amygdaleæ characterized, in connexion with structural re-
semblance, by the presence of amygdalin, which under
proper circumstances yields an oil and prussic acid; the
Spiræœ containing an emetic principle, the *Dryadeæ* and
Roseæ containing tannin, and lastly the *Pomaceæ* contain-
ing *phloridzin.*

We may find proof of the advantage and beauty of this
mode of studying Materia Medica, in every order of the Jus-
sieuan system, evincing that philosophy may be main-
tained even in the apparently disjointed and promiscuous
materials of this department, and that nature, true to herself,
alone affords the clue to its detection. To search for
properties in one class which belong to another, would
be just as rational as to expect "grapes from thorns or figs
from thistles." But we must return from this digression to
the work before us.

The primary division into plants is into two classes, *Co-
tyledonous* and *Acotyledonous.* The first is divided into

Dicotyledonous or Exegenous, and *Monocotyledonous* or Endogenous. The plants belonging to this class are most highly organized, and of course are most likely to attract attention. Our author has commenced with them, and in this respect differs from Pereira, who commences with vegetables the least organized and terminates with those the most complex. The four great subdivisions have been prominently introduced, and serve as a bond of further association; such are the *Thalamiflorae, Calyciflorae, Corolliflorae,* and *Monochlamydeae* or Apetalae.

We have already noticed the fact, that this book contains much new and interesting information respecting the plants affording, and the substances constituting, the vegetable Materia Medica. We refer as evidence of this to the articles Gambogia, Elemi, Catechu, Senna, Kino, Assafœtida, &c. The account of the latter substance is so original, that we think it important to present it to our readers, as in addition to general points of novelty, it introduces to pharmacologists a new plant.

" Assafœtida, a produce of Persia and Affghanistan, is mentioned in the ancient Sanscrit Amera Cosha. The ancients highly esteemed a gum-resin which the Romans called *Laser,* and the Greeks οποςκυρηναϊκός, or the Cyrenaic Juice, from being produced in that region. The plant διαφιον yielding it was an Umbellifer, and is represented on the coins of Cyrene. It has been discovered of late years, and named *Thapsia Silphium.* This Laser had become scarce even in the time of Pliny, who as well as Dioscorides describes another kind as obtained from Persia, India, and Armenia, which was probably the same that was known to the Hindoos. Avicenna describes *hulteet* as of two kinds: one, of good odour, from Chiruana (Cyrene?), and the other fœtid, the present *Assafœtida.* The term *assa* is no doubt of oriental origin, since it is applied to other gum-resins. Thus Benzoin is called *hussee-looban;* it used to be called *Assa dulcis* in old works. Dr. Lindley has received the seeds of a Ferula called *hooshee. Anjedan,* the fruits or seeds (φυλλον of the Greeks,) is usually translated *Laserpitium.* The plant is called *Angoozeh* by the

Arabs.   The root of *Silphion* is described by Arrian as affording food to herds of cattle on Paropamisus.

Assafœtida is produced in the dry southern provinces of Persia, as in the mountains of Fars and of Beloochistan, but chiefly in Khorassan and Affghanistan ; likewise to the north of the Hindoo Khoosh range of mountains, where it was found by Burnes and also by Wood's expedition to the Oxus.   Dr. Falconer found it in Astore, introduced the plant into the Saharunpore Botanic Garden, as mentioned in the author's " Product. Resources of India," and has obtained from it a small quantity of Assafœtida.   He also sent home numerous seeds, which were distributed from the India House to several gardens ; but the author has not heard whether any plants have been produced from them.   But he has no doubt that some of those which the author is informed by his friend Dr. Christison are still in the Edinburgh Botanic Garden, were produced from these seeds, and not from those sent by Sir John M'Neill.   The Assafœtida is conveyed on camels into India across both the Punjab and Bhawulpore, and is sold in large quantities at the Hurdwar Fair.   It is also conveyed down the Indus and by the Persian Gulf to Bombay.

Two or three kinds of Fruit called Seeds are met with, which are said to be those of the Assafœtida plant ; but there is no proof that more than one plant yields Assafœtida.   Dr. Falconer, an excellent botanist, after examining the original specimens, considers the plant he saw in Astore to be the same as that figured by Kæmpfer ; and Dr. G. Grant, who saw the plant at Syghan, says, as stated by Dr. Christison, that its roots, leaves, and flowering stem correspond on the whole with Kæmpfer's description, except that the root is deeply divided, like the outspread hand.   The E. P. assign *Ferula persica* as probably yielding some Assafœtida.   There is no doubt that its seed has been sent from the northwest of Persia as those of the Assafœtida plant : but there is no proof, nor indeed is it probable, that it yields any of the Assafœtida of commerce.   The gum-resins of these Umbelliferæ are too similar to each other, for any but experienced pharmacologists to determine between *inferior* Assafœtida and varieties of Sagapenum or other Gum-resins.

As Dr. Falconer, the author's friend and successor as Superintendent of the East India Company's Botanic Garden at Saharunpore, has had excellent opportunities for examining the Assafœtida plant, both in its

native sites and as cultivated by himself, he has favoured the author with the following full account of this important plant, which he conceives belongs to a genus allied to but distinct from Ferula.

NARTHEX (Falc. MSS.)

Calycis margo obsoletus.   *Petala*   ? *Stylopodium* plicato-urceolatum. *Styli* filiformes demum reflexi.   *Fructus* a dorso plano-compressus margine dilatato cinctus.   *Mericarpia* jugis primariis 5 : 3 intermediis filiformibus, 2 lateralibus obsoletioribus, margini contiguis immersis.   *Vittæ* in vallecul's dorsalibus plerumque solitariæ (valleculis lateralibus nunc sesqui vel bi-vittatis,) commissurales 4—6 variæ inæquales, exterioribus sæpe reticulatim interruptis. *Semen* complanatum. *Carpophorum* bipartitum. *Umbellæ* pedunculatæ compositæ. *Involucrum* utrumque mullum—Genus inter Peucedaneas, calycis margine edentato, fructus vittis magnis, commissuralibusque inæqualibus et involucro utroque nullo distinctum ; Narthex nuncupatum, a vocabulo, ναρθηξ apud Dioscoridem Ferulæ attributo.

N. Asafœtida (Falc.) Caul tereti simplici, petiolis dilatatis aphyllis instructo, foliis radicalibus fasciculatis, petiolis trisectis, segmentis bipinnatisectis, laciniis lineari-lingulatis obtusis, inæqui-lateralibus integris vel varie sinuatis decurrentibus.—Asa fœtida Disgunensis, Kæmpf. *Amœnit. Exot.* p. 535.   Ferula Asafœtida.   Linn. *Mater. Med.* p. 79.   De Cand. *Prod.* iv. 173.   Lindl. *Flor. Med.* p. 45.

Habit. in apricis inter saxa in valle " Astore" vel " Hussorah" dictâ prope Indum, ultra Cashmeer : indigenis Daradris " Sip" vel " Sup." Legi fructigerum prope Boosthon 21° die Septembris, 1838.

Descrip.   A tall perennial plant, 5 to 8 feet high.   *Root* fusiform, simple, or divided, a foot or upwards in length, about 3 inches in diameter at the top, with a dark grayish transversely corrugated surface : the summit invested above the soil with dark hair-like fibrous tegmenta, the persistent exuviæ of former years : cortical layer thick and tough, white or ash-coloured in the section, readily separable from the central core, and, like the latter, abounding in a white, milky, opaque, excessively fœtid, alliaceous juice. *Leaves* collected into a fascicle above the root, numerous, large, and spreading, about 18 inches in length in the adult plant, of a light green colour above, paler underneath, and of a dry leathery texture : the petioles terete amplexicaul, and channeled at the base, trifurcated a little above it, the divisions united at an angle with each other, like the legs of a tripod, and bipinnately sected : the leaf-segments linear-ligulated, more or less obtuse, entire or sinuately lobed, variable in their offset, being either alternate or opposite, for the most part unequal-sided, and decurrent along the divisions of the petiole, forming a narrow winged channel upon the latter.   *Midrib* prominent on the under side, veins slender and anastomosing by numerous reticulations.   The leaves observed in a young growing plant were about 9 inches in length, the leaf segments being from 2 to 4 inches long by 4 to 6 lines in width.   *Stem* erect, terete, simple, striated, about 2 inches in diameter at the base, solid throughout, the spongy medulla being traversed by scattered

tough fibrous bundles of vessels, invested with alternate, vaginating. dilated, aphyllous petioles, and terminating in a luxuriant head of compound umbels. General as well as partial involucre entirely wanting. *Umbels* 10 to 20 rayed, emitted from the dilated spherical head of a common peduncle, the rays 2—4 inches in length. *Partial umbels* with very short rays aggregated into round capitula varying from 10 to 20 rays in the fertile, and from 25 to 30 in the barren umbellulæ. *Flowers* small; barren generally mixed up with the fertile flowers(?). Border of the *Calyx* obsolete, being reduced to very minute denticular points. (Petals in the barren flowers small oblique, unequal-sided, acute, without an elongated acumen?). *Stylopodia* urceolate and plicated, with a sinuous margin. *Styles* filiform, reflected in the ripe fruit, rather short and slender, attached by a broad base. *Fruit* from 7 to 15, ripening on the partial umbels, supported on short stalks. *Mericarps* varying from broad elliptical to elliptical obovate, 5—6 lines long by 3 to 4 lines broad, flat, thin, foliaceous, but somewhat convex in the middle, with a dilated border, generally unequal sided, of a dark reddish-brown towards the centre, lighter towards the margin, perfectly smooth, with somewhat of a glossy surface. Dorsal primary ridges 5: the three middle ridges filiform, slightly crested towards their confluence at the apex: the lateral ridges more obsolete, situated close to the margin, immersed in the substance of the border, but distinctly seen on the surface of commissure, and confluent with the middle nerve of the latter. The dilated border as wide as the space occupied by the three middle ridges. *Vittæ* in the dorsal furrows large and broad, occupying the entire width of the valleculæ, stretching from base to apex, usually solitary, but sometimes double in one or other of the middle furrows, and generally double or dichotomous, with a small branch in the broadest side of the margin, turgid with a fœtid juice: vittæ of the commissure varying from 4 to 6, very equal and variable: one very slender vitta, which is frequently dichotomous in two fine threads confluent at the apex, being placed close on either side of the middle nerve; another of the size of the dorsal vittæ, situated more outwards, and a third at the inner side of the dilated border, over the edge of the seed, more slender, but frequently subdivided and interrupted, so as to cover the border with a beautiful network of anastomosing ramifications. *Seeds* flattened, with plain albumen. *Carpophores* bipartite, persistent, twice the length of the pedicels. *Flowers* white?

The plant above described I believe to be the true " Asafœtida disgunensis," or " Hingiseh" of Kæmpfer. It does not appear to have been met with by any other botanist since it was examined *in situ* by that excellent and careful observer a century and a half ago.

I have compared my materials with Kæmpfer's description and figures (Amœn. Exot. p. 537,) and with his original specimens contained in the Banksian collection in the British Museum, and found them, so far as comparison could be instituted, to agree in every essential respect. The leaves " instar Pœoniæ ramosa" as represented in his figures, have the segments more obtuse and sinuated, and more alternate in their offset than they are represented in my drawing; but

he describes them as being very variable in form, and some of the numerous leaf-specimens in his herbarium correspond with the figure which I have given. Kæmpfer mentions the umbellulæ as having only 5 or 6 rays, whereas I found them as numerous as 25 to 30 in the sterile capitula, and from 10 to 20 in the fertile ones. But he states that he never saw the plant in flower, and his description was probably drawn from the ripe state, in which the partial umbels occasionally present no more than 7 fruit-bearing stalks. There are two mericarps in his herbarium, agreeing exactly in form and in the developement of the dorsal juga with those met with by me in the Astore plant; but Kæmpfer's specimens are glued down on paper, and they seem to have undergone some decay or alteration by which the vittæ have been emptied, so that their number and size cannot be distinctly made out. But they appear to be solitary in the dorsal valleculæ, and there is no indication of the numerous striæ represented in the figures of the fruit given in the Amœnitates, which may have confirmed authors in the belief that Kæmpfer's Assafœtida plant belonged to a species of Ferula. These mericarps are perfectly smooth, and exhibit nothing of the "quadatenus pilosum sive asperum," described in the Amœnitates, p. 538. Dr. Lindley, in his Flora Medica, p. 45, after an abridgment of Kæmpfer's description, states, (it is not mentioned upon what evidence,) the vittæ of the back to be "about 20 or 22, interrupted, anastomosing, and turgid with Assafœtida: of the commissure 10." This account will apply to the fruit of a species of Ferula, but is entirely at variance with the characters presented by the fruits of the plants observed by Kæmpfer in Persia, and by myself in Astore.

Kæmpfer in his description says: "Folia sero autumno ex vertice progerminant, sex septem, et pro radicis magnitudine plura vel pauciora: quæ per brumam luxuriose vigent adultoque vere exarescunt." From the information which I gathered on the spot, confirmed by subsequent observation upon the growing plants introduced into the Botanic Garden at Saharunpore, the leaves of the Astore Assafœtida plant make their appearance in spring, and not in autumn, surviving through the winter, as stated by Kæmpfer, respecting the Persian form. With these slight discrepancies, his description might serve for the Astore plant.

Narthex, both in the characters of the flowers and fruit, and in its "Pæony-leaved" habit, differs widely from any known species of Ferula, and appears to constitute a distinct and well-marked genus.

In the Dardoh or Dangree language (the Dardohs being the Daradi of Arrian) the plant is called "Sip" or "Sup." The young shoots of the stem in spring are prized as an excellent and delicate vegetable.

The species would appear to occur in the greatest abundance in the provinces of Khorassan and Laar in Persia, and thence to extend on the one hand into the plains of Toorkestan on the Oxus north of the Hindoo Khoosh mountains,

where it seems to have been met with by Sir Alex. Burnes,[*] and on the other to stretch across from Beloochistan, through Candahar and other provinces of Affghanistan to the eastern side of the valley of the Indus, where it stops in Astore, and does not occur in great abundance. The whole of this region, which constitutes the head-quarters of the gum-bearing Umbelliferæ, possesses the common character of an excessively dry climate, indicated in Berghaus's hygrometric map in Johnson's Physical Atlas by a belt of white.

Besides the gum-resin, the fruit of *Narthex Assafœtida* is imported into India from Persia and Affghanistan, under the name of " Anjoodan," being extensively employed by the native physicians in India : " Anjoodan" being the epithet applied to the seed of the " Heengseh," or " Hulteet," by Avicenna, also quoted by Kæmpfer, and used by the Indo-Persian and Arabic writers generally in describing the Assafœtida plant. Another Umbelliferous fruit is also imported with it, and sold under the name of " Dooqoo" (a word evidently connected with the δαυχος of the Greeks,) being recommended as an excellent substitute for " Anjoodan," which it closely resembles in its general appearance. This I found to be the fruit of a species of true Ferula ; it is one of the two Assafœtida-like fruits mentioned by Dr. Royle as occurring in the bazaars of northern India. The species of Ferula yielding this fruit may furnish some one of the obscurely-known gum-resins resembling Assafœtida produced in Persia.

I have examined another kind of Umbelliferous fruit in the collection of Dr. Royle, labelled as " the seed of the wild Assafœtida plant collected and brought to England by Sir J. Macneill from Persia," which differs widely from the fruit both of Narthex and of Ferula, and belongs to another tribe of the order." H. F.

The above description of the genus Narthex, is accompanied with beautiful illustrations of form and structure.

The author appears to be perfectly at home, and speaks with authority from observation wherever the products of the East Indies are discussed.
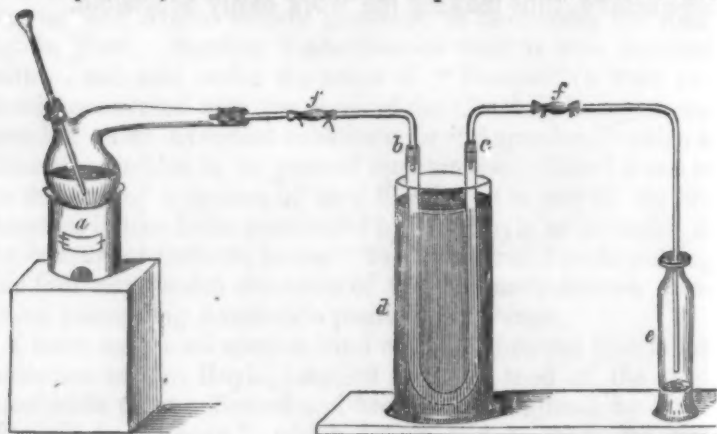
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[*] Burnes mentions the plant as an annual, probably in consequence of the annual decay of the stems. He states that sheep browse on the young shoots.

We have sufficiently extended our notice of the Manual of Materia Medica and Therapeutics, to show that it possesses great merit, which will be a pretty sure guarrantee of its acceptableness to the profession. The department of Materia Medica is now so extended, that the treatises recently issued from the press, partake of the nature of Cyclopœdias. To the student, whether of pharmacy solely or medicine, an extended manual as the present cannot but be regarded with favour.

An American edition, with the introduction of all that pertains to the indigenous Materia Medica, and the Pharmacopœia of the United States, has just been published in large octavo, thus making the work easily accessible.

ART. LIX.—WÖHLER'S PROCESS FOR THE PREPARATION OF
PURE HYDROCYANIC ACID.

Cyanide of potassium is prepared by fusing together 8
parts of dry ferrocyanide of potassium, and 3 parts of pure
carbonate of potash containing carbon (ignited cream of
tartar), and 1 part of charcoal in fine powder in a covered
crucible; the mass while still warm is powdered, and placed
in a stoppered bottle of such a capacity that when 6 parts
of water are added the bottle is quite filled*. When the
cyanide of potassium is dissolved, and the metallic iron is
all deposited, the clear solution is poured into the retort a.

The retort is connected by means of a bent tube with the
U-shaped tube b c; each arm of this tube is about 18 inches
long and ½ to ¾ of an inch wide. It is filled with small
pieces of fused chloride of calcium, with the exception of
the first one-third of b, which contains small pieces of the
above-mentioned black cyanide of potassium.

This tube stands in a cylindrical vessel d of equal height;
from the arm c proceeds a long and rather narrow conduct-

* The cyanide prepared by Liebig's process is less fit for the prepa-
ration of prussic acid; on account of the large amount of cyanate of pot-
ash it contains, much carbonic acid is disengaged, which renders the
condensation of the acid far more difficult. |

ing tube, bent at a right, or any other convenient angle, into
the vessel e; by means of the caoutchouc tubes ff, the ap-
paratus is made more safe.   When the apparatus is thus
disposed, and all the junctions and corks found to be per-
fectly tight, the cylinder d is filled with ice-cold water, and
the small and narrow flask e, destined to receive the acid,
is immersed in snow or ice and salt, up to the neck.

A cold mixture of equal parts of sulphuric acid and water
is now poured through the funnel into the cyanide of pot-
assium in the retort in very small successive portions; for
2 parts of the melted mass of cyanide of potassium 1 part
of oil of vitriol is taken; the mass in the retort is so highly
heated by this addition of the dilute acid as to begin to boil;
the acid must therefore only be added at long intervals,
taking care that no air enters with it.   It is probable that a
concentrated solution of tartaric acid would be preferable to
the sulphuric acid. During the addition of the sulphuric
acid a considerable quantity of prussic acid is developed,
which would be carried out of the apparatus along with
air; to avoid this the chloride of calcium tube is placed in
cold water and the recipient in ice.   When all the acid has
been added, and the fluid in the retort no longer boils, the
cold water is removed from the cylinder d by means of a
siphon, and replaced with water at a temperature of 85° to
90° F. By this means the prussic acid previously conden-
sed in the chloride of calcium tube is evaporated, and passes
into the recipient e; at the same time the contents of the
retort are brought to gentle ebullition, which is continued as
long as prussic acid is disengaged.   The tube f may be sur-
rounded with ice also, when conveniently bent, so as to
render the condensation of the acid more certain.   Without
the use of ice the preparation of the anhydrous acid should
by no means be attempted; and even then, the operations
and all experiments with this substance, should be conduct-
ed with the greatest care and precaution.—*Chem. Gaz. from
Handwörterbuch der Chemie.*

ART. LX.—EXAMINATION OF THE CASTOREUM OF SIBERIA.

By Fr. Müller.

M. Müller some time since prepared a tincture of castor according to the Prussian Pharmacopœia, with one ounce of the Siberian castor to six ounces of alcohol. He was surprised at the great quantity of insoluble residue of an earthy aspect, and suspected a falsification, and examined with care the composition of this specimen of the drug.

It had been bought for good castor of Siberia, and according to its exterior aspect it would pass for such.—It had a considerable specific gravity, 1.515; it had a compact texture; it presented only on the exterior, and in several places, the thin membrane, which did not extend into the interior of the sack ; and it had a deep blackish brown colour which grew lighter towards the interior, and presented at the centre a yellowish grey nucleus. Its odour and taste were decidedly those of good castor.

The result of the chemical examination of 100 parts was:

45.833 of resin and essential oil dissolved by alcohol.

2.256 of a soft resin dissolved by ether.

40.646 of carbonate of lime.

1.800 of gummy matter extracted by water.

8.125 of celular tissue.

1.340—loss.

———————————

100.000.

The results of chemists, on the proportion of the carbonate of lime in the two sorts of castor differ so much that they will not serve to judge of their purity; some admitting a greater amount of the calcarious salt in the Siberian than in the Canadian variety, and others giving the contrary opinion. The degree of dryness is undoubtedly a very im-

portant element of judgment in ascertaining the purity of castor ; that which has been treated by M. Müller and in which the proportion of carbonate of line surpasses that of other analyses, was very dry and hard, so as to be easily reduced to powder; its colour, form and odour would not admit of its being confounded with the castor of Canada. The enormous proportion of carbonate of lime, and the small quantity of celular tissue also would distinguish it from ordinary Siberian castor. Probably the organic substances had disappeared for the most part, owing to a pathological condition, and they have been replaced by carbonate of lime; a fact which has often been observed in the morbid secretions of the animal organism.

This examination shows what differences sometimes occur in the composition of certain medicines, and which are the causes of the want of accordance in the results of chemists.—*Jour. de Pharm. et de Chim., from Archiv. der Pharm.*

ART LXI.—IMPROVEMENTS IN MAKING THE CYANIDES AND FERROCYANIDES OF POTASSIUM AND SODIUM.

By James Laming.

The patentee, before describing the invention as communicated to him from abroad, has, for the better understanding of the improvement, detailed the chemical facts or principles upon which they are founded; these are as follows:

1. When animal matter, which contains nitrogen as well as hydrogen and carbon, is exposed to a high temperature, not exceeding low red, an equivalent of nitrogen combines

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with three equivalents of hydrogen to form an equivalent of ammonia, and the carbon is separated.

2d. When ammonia is exposed to carbon at a full red heat, an equivalent of ammonia exchanges two of its equivalents of hydrogen for two equivalents of carbon, and thus becomes prussic or hydrocyanic acid.

3d. If free potassium or sodium be also present, the equivalent of ammonia parts with all its three equivalents of hydrogen, and the nitrogen which remains takes in their place two equivalents of carbon to form cyanogen, and one equivalent of potassium or sodium, as the case may be, to form a cyanide of the metallic base.

4th. When animal matter is exposed to heat, its temperature becomes gradually increased to low redness before it assumes that high temperature indicated by a full red colour; therefore, whenever animal matter is subjected to what is called destructive distillation, the formation of ammonia must take precedence, in point of time, to that of prussic acid or of the cyanides.

5th. When the oxide of potassium, or of sodium, or the carbonate of either of those oxides, is intimately mixed with carbon, and exposed to a heat approaching to whiteness, its metallic base is set free from the oxygen with which it was previously combined, and rises in vapour. If ammonia comes into contact with the mixture of carbon and alkali, or of carbon and alkaline carbonate, the separation of the metallic base from its oxygen takes place at a lower temperature—under such circumstances, a full red heat being sufficient. In the case of the carbonates, the metallic bases, potassium and sodium are liberated from the carbonic acid also, whenever they separate from their oxygen.

6th. Cyanide of potassium, or cyanide of sodium, by exchanging an equivalent of every three equivalents of its base for an equivalent of iron, is converted into the corresponding ferrocyanide, or what is called, in commerce, prussiate of potash, or prussiate of soda; and this change may be ef-

fected by causing the cyanides of the respective metals, dissolved in water, to come into contact with iron, or oxide of iron, in a state of division.

The ordinary way of combining potassium or sodium with cyanogen, preparatory to making the prussiate of potash, or prussiate of soda, for commerce, is to expose in iron pots an impure carbonate of one of those alkalies and animal matter to a red heat, and to trust for the necessary contact of the nitrogen and carbon of the animal matter with the metallic element, to the thorough incorporation of the ingredients of the pasty mass by stirring. While the temperature of the animal matter is approaching redness, ammonia is constantly being generated, and as it is volatile, it escapes and is lost; and this continues until the heat becomes great enough to convert the nitrogen and carbon of the animal matter into cyanogen, and to fix that cyanogen, by combining it with the metallic base of the alkali. Another source of loss is, the difficulty of causing the different elements contained in the pasty mass to combine; for, before each can be brought into contact with the other, by mechanical agitation, their temperature becomes elevated, and great part of the resulting nitrogenous gases, which are volatile, have time to escape. There is a third evil attending the ordinary process, namely, the proportion of carbon in animal matter, compared to its nitrogen, is greater than that in the alkaline cyanides; the greater part of this carbon, from its fixed nature, remains to solidify the mass from which the nitrogen so freely escapes; so that it becomes necessary to suspend the addition of the animal matter, on account of the mass being too solid for the chemical action to go on before enough of nitrogen has been combined to convert much of the alkali into prussiate.

Two patents have already been granted for methods of preventing the losses sustained in the ordinary way of making the prussiates of potash and soda. By one of these methods the ammonia which is liberated from a heated

mixture of alkali and animal matter, is conducted first over
the surface of fused alkali (the said alkali having no admix-
ture of carbon) and afterwards into a vessel containing a
solution of alkali.   The other of these methods directs that
the ammonia, which results from animal matter exposed to
heat, be made to pass upwards and downwards through a
series of vertical pipes, arranged on the principle of inverted
syphons, heated to redness, and charged with a mixture of
charcoal, potash, and iron, reduced to small fragments.
With regard to the former of these methods, it is well known
to chemists that fused alkali has no power of decomposing
ammonia into cyanogen unless carbon be present; and with
regard to the latter method, it is obvious that, as the mate-
rials, if brought into a state of fluidity or pastiness, must, of
necessity, choke the passage of the pipes, the method de-
mands that the mixture in the inverted syphons should be
kept from losing its solid or granular state ; and the continu-
ance of that state is secured by the large proportion of in-
fusible charcoal compared to the fusible potash, which the
patentee prescribes, as fulfilling his intentions in a satisfac-
tory manner.

Now, under the present invention, the patentee makes
use of charcoal or other form of carbon, in powder, mixed
with one of the alkalies, or its carbonate or other salt, capa-
ble, under the circumstances, of surrendering its metallic
base to cyanogen.   This mixture is constantly maintained
in a fused state, so as to be fluid, or at least in a pasty con-
dition, which is highly favourable for converting the metal-
lic base of the alkali, or its salt, into a cyanide, and which
takes place rapidly under such circumstances, when a cur-
rent of ammonia gas is introduced to the fused mixture.
The metallic base of potash, or soda, or of their compounds
respectively, as the case may be, is liberated by the agency
of the heated carbon, assisted by the affinity of the metallic
base for the cyanogon, which is at the same time formed by
the combination of heated carbon with the nitrogen of the

ammonia; cyanide of the metallic base is thus produced, and this product is constantly augmented in quantity (the current of ammonia being continued) until great part of the alkali, or other compound of its base, has become converted into cyanide. When an alkaline carbonate is used, powdered charcoal to the amount of more than 30 per cent. of its weight may be added, without destroying the fluidity of the mixture if the temperature is raised to a full red. When the potash or soda is in a caustic state, a larger proportion of charcoal may be added; or, what is more advantageous, the mixture will remain fluid, although the heat be raised not so high. Whether the ammonia gas is passed through the mixture of carbon and fused alkali, or other compound of its metallic base (which is preferred), or over its surface, it is better to have more than one vessel charged with the heated materials, and so connected together by pipes, that the nitrogen of the ammonia, which escapes the chemical reaction in the first vessel, shall not pass through the whole series without combining. The apparatus thus acts on the principle of a series of Woolfe's bottles, and according to this invention all the vessels are made red-hot, except the last, into which water, or some liquid convenient for arresting the vapours of alkaline metal, is put; or otherwise the vapours might be lost. The first product, as in the common process for making prussiate, is a cyanide of the alkaline metal present, which may be dissolved out from the mass, technically called "metal," by boiling the latter in alcohol, of about 0·896 specific gravity, from which, filtered hot, it spontaneously separates, in great part, on cooling. To obtain the ferrocyanide, the metal is to be treated in the usual way, namely, its soluble parts dissolved in water, then treated with iron, the solution evaporated, and when sufficiently concentrated and clear, set aside to crystallise; and the rough product is afterwards purified by recrystallisation

The patentee states, that he does not claim the invention of any process for dissolving out or obtaining either cyanide

or ferrocyanide from the compound termed "metal ;" nor
does he claim the construction of apparatus wherewith the
process or processes may be carried on : but he describes
some arrangements which have been found to answer. One
of these consists of three iron air-tight covered pots, com-
municating with one another in the manner of ordinary
Woolfe's bottles ; that is to say, the induction-pipe of the
first pot reaches to near its bottom—its eduction-pipe
reaches down the interior of the second pot to near its bot-
tom, and the eduction-pipe of this second pot terminates in
like manner in the third pot ; while the eduction-pipe of the
latter plunges beneath the surface of some water or other
liquid, convenient for oxidising and arresting vapours of
alkaline metal. Each of the pots has a man-hole in its
cover, by means of which it may be charged and discharged,
and a door by which it may be perfectly closed. Each
covered pot is so set in a furnace as to be heated to a tem-
perature great enough to keep its contents in a state of con-
stant fusion. Its charge, when fused, should about half fill
it. By the use of this apparatus, the ammonia which is forced
into the first pot, by reason of its own elasticity under the
pressure attending its assumption of the gaseous state, passes
through the fluid mixture of fused alkali and carbon in that
pot, being there decomposed into nitrogen or cyanogen, and
as cyanogen, combining with and saturating the alkaline
metal present; after which, the ammonia or its nitrogen or un-
combined cyanogen, which results from its action on the car-
bon still remaining in that pot, passes into the second pot, to
convert the alkaline metal, there present, into a cyanide. In
like manner the ammonia or its nitrogen, or the resulting cya-
nogen, may arrive in the third pot; then is the time for stop-
ping the operation, in order that the two first pots may be
emptied and re-charged. Owing to the volatility of the al-
kaline metals at high temperatures, the pipes of communi-
cation between the pots are apt to become obstructed; for
this reason they are proposed to be made straight, and joined

together at right angles, in such a manner that by removing a screw-plug from the end of each rectilinear piece, the passage through it may be cleared by passing into it a short rod of iron; in order that this process need not be often repeated, the diameter of the pipes should be as great as convenience admits of.

The patentee next describes a modification of the preceding apparatus, wherein no pressure is required to overcome the resistance opposed to the current of ammonia by the fluid mass into which the induction-pipes of the preceding apparatus are immersed. In this modification, all the induction pipes stop short at the covers of the pots, except that of the open pot, which may be allowed, without much inconvenience, to dip below the surface of the water or other liquid intended to arrest the metallic vapours.

The ammonia gas, in this case, urged forward by an inconsiderable amount of pressure, comes into contact with the surfaces of the fused ingredients in the several pots in succession, until it is either decomposed and its nitrogen absorbed, as in the preceding case, or escapes by the last eduction-pipe of the series; to prevent which, either the number of pots may be increased, or, what is better, each of the three should be furnished with agitators, moved by machinery or labour. When the latter arrangement is adopted, each pot should be furnished with a lofty conical cover, containing, at its apex, a stuffing-box, in which the axis of the agitator turns, and which is kept sufficiently cool by a stream of water running through a small cistern, which embraces the stuffing-box. With this apparatus, the fused ingredients may be either in a fluid, semi-fluid, or pasty condition.

The patentee claims the making of the cyanides and ferrocyanides of potassium and sodium; or, as they are called in commerce, prussiates of potash and soda, in any suitable apparatus, by passing ammonia (either pure or mixed with such other gases as do not prevent the desired result) over

the surface, or through the mass (according as the induction
pipes may dip or not below the surface) of potash, or soda,
or other compound of potassium or sodium (capable, under
the circumstances, of setting free its metallic base) in a state
of fusion by heat, and mixed with charcoal or other form of
carbon in powder, and in such proportion as to be adequate
to effect, without destroying by its bulk, the fluid, semi-fluid
or pasty condition of the resulting mass. And, further, he
claims, for the process or processes of this invention, the
sole use of ammonia, or mixture, or combination of ammo-
nia with other gases or vapours, whatever be the source
from which it is obtained ; provided always that in such
mixture or compound there be no substance present capa-
ble, by its nature, of preventing the desired result. He
claims, for example, the application to this invention of am-
monia or carbonate of ammonia, obtained from gas-water,
from urine, from the liquor condensed in the distillation of
bones or other animal matter, or from one or other of the
salts of ammonia, or a solution of ammonia ; and also the
ammonia or carbonate of ammonia which is obtained di-
rectly, mixed with other gases, in the carbonisation of
bones, and other animal matters, and in the chemical treat-
ment of guano. Whatever be the source from whence
the ammonia is obtained, it is desirable that it should
be made as free from the vapour of water as possible
before it is introduced to the fused materials; for this pur-
pose the substances from which it is to be eliminated may
be dried, or else the ammonia may be passed, in an elastic
state, in contact with some substance known to chemists to
be convenient for desiccating that gas.

Instead of obtaining the ammonia by a separate process,
or from a distinct vessel, the inventor sometimes causes it to
be given off from animal matter contained in the vessel or
vessels in which the cyanide is formed. For this purpose
it is better to use the potash or the soda in a caustic state,
causing it, while in that condition, to dissolve the animal

matter. The following is the mode of proceeding:—A caustic solution of alkali, in water or other convenient liquid, is first made boiling hot, and to it, while boiling, as much animal matter is added as it will readily dissolve; the solution is next evaporated to dryness, and the mass preserved in that state for use. When a portion of this mass is put into each of the heated vessels, except the last, of such a series as has been described, and the last heated vessel is charged with carbon, mixed with some convenient compound of an alkaline metal, as before stated, then the ammonia, which escapes from any one of the vessels in the series, will have to pass through one or more subsequent vessels, and thus tend to suffer decomposition; the resulting nitrogen being converted into cyanogen, and then being absorbed. This admits of the cheaper kinds of animal matter being used—such as the undried flesh and viscera of carrion, and old woollen flock and rags, which, by reason either of humidity or too great volume, cannot conveniently be mixed in their natural state with red-hot alkali. The patentee claims this modification of the process as part of the invention for which this patent has been granted. Sometimes the mass resulting from the desiccation of the solution of animal matter in caustic alkali is put into red-hot open pots; in this case, much ammonia is lost, but the improvement which is introduced by replacing the ordinary mechanical admixture by an intimate chemical combination, affords a greater product in prussiate than can be obtained from an equal quantity of animal matter treated in the ordinary way.

Chemist, from Newton's Journal.

ART. LXII.—ON TURPENTINE-CAMPHOR.
By M. Wiggers.

THE author has communicated some experiments on tur-
pentine-camphor, the best proportions for obtaining which
in large quantities he found to be 8 parts oil of turpentine,
2 nitric acid of 1.25 to 1.3 spec. grav., and 1 part alcohol
of 0.863 spec. grav. This mixture is frequently shaken for
some days until, on being set aside at 68°–78°, the cam-
phor separates from the liquid. Turpentine-camphor is
only formed from that modification of the oil of turpentine
which yields a crystalline compound with muriatic acid;
and no camphor could be procured from an oil which could
not be combined with muriatic acid. Sulphuric, muriatic
and acetic acids act in precisely the same manner as nitric
acid.

The camphor obtained, according to this process, is
slightly coloured; it is purified by recrystallization, for
which purpose it is dissolved in boiling water. The analy-
sis of this pure camphor proved it to be a hydrate of the
oil of turpentine corresponding to the formula $C^{20} H^{16}$
6aq. :—

Carbon,	.	.	.	63.31	20	63.21
Hydrogen	.	.	.	11.55	22	11.55
Oxygen	.	.	.	.	6	25.24

When this body is heated to melting, it loses 2 equiv.
water, and the fused body thus obtained is $C^{20} H^{16} + 4aq.$

If either of these two hydrates be placed in a vessel, and
a current of dry muriatic gas be passed into it, the camphor
becomes liquid, disengages heat, and two colourless layers
are obtained; the lower one is muriatic acid, formed from
the water of the camphor ; the upper one is of an oily con-
sistence, and is a combination of oil of turpentine with mu-
riatic acid, $C^{20} H^{16} HCl.$

On treating turpentine-camphor with hydriodic acid, an

analogous compound was not formed, but the hydrate of the oil of turpentine with 1 equiv. water. The bodies examined are therefore combinations of oil of turpentine with 1, 4 and 6 equivs. water, and with 1 equiv. muriatic acid.— *Chem. Gaz. from Ann. der Chem. and Pharm.*

ART. LXIII.—ORSERVATIONS ON MAGNESIA AS AN ANTI- DOTE TO ARSENIC. By Dr. Christison.

Dr. Christison's attention was lately turned to this subject by a case of poisoning with arsenic having come under his notice, in which magnesia seemed to prove very serviceable. Immediately afterwards he observed it announced in a French scientific newspaper, 'L'Institut,' May 20, that a paper had been read before the French Institute two days before by M. Bussy, to prove, "That magnesia, not strongly calcined, removes arsenic entirely from a state of solution in water; that this is effected still more completely by magnesia in the gelatinous state; and that animals which have taken arsenic are invariably saved if made to swallow magnesia." While waiting for the details of M. Bussy's inquiries, Dr. Christison made a few experiments to ascertain the amount of the action of magnesia; and he found that the dense magnesia of the shops exerts very little action in removing arsenic from solution in water; that a very light magnesia, now largely manufactured at Belfast, and quite free of carbonic acid, will remove about a twenty-fifth of its weight of arsenic from solution in water, when agitated with the solution for a few minutes; so that even ammoniacal nitrate of silver does not any longer indicate the presence of arsenic; that the same magnesia will remove about a twelfth of its weight of arsenic if agitated

occasionally for a period of 8 or 12 hours; that this pro-
portion is removed entirely in less than 3 minutes if the
mixture of magnesia and water be previously near the tem-
perature of 212°; and that the same proportion is removed
with as much speed at ordinary temperatures, if the mag-
nesia be used in the form of gelatinous pulp, as thrown
down in a cold solution of sulphate of magnesia by solu-
tion of caustic potash and washed with cold water.

It is well known that magnesia was proposed many
years ago by Mr. Hume of London as an antidote for ar-
senic, and that several cases have been published in which
it appeared to have been of service; but that its general
utility has been doubted or denied on account of the appa-
rent want of chemical action between oxide of arsenic and
magnesia.   M. Bussy's inquiries will probably clear up
these difficulties.   Meanwhile it appears probable, from
the experiments described above, that the general belief in
the want of action between magnesia and oxide of arsenic
has arisen from the circumstance that for a long time no
other magnesia has been in current use in medical practice
in Britain except the dense variety, which appears to exert
very little action on arsenic in solution on account of its
great density.

Dr. Christison promises more accurate experiments and
a statement of the successful case hereafter.   Meanwhile
it appears advisable that, when magnesia is used as an an-
tidote, and cannot be promptly obtained in the gelatinous
state, the light calcined magnesia should alone be employ-
ed, and in the proportion of between 30 and 50 parts to 1
of arsenic.—*Chem. Gaz. from Monthly Journal of Med
Science.*

ART. LXIV.—ON A NEW PROCESS FOR OBTAINING FORMIC ACID, AND ON THE PREPARATION OF ALDEHYDE AND ACETIC ACID BY THE USE OF THE BICHROMATE OF POTASSA. By Professors W. B. ROGERS and R. E. ROGERS of the University of Virginia.

I. *Process for Formic Acid.*

SINCE the important discovery of Döbereiner, that formic acid is evolved from a mixture of tartaric acid, peroxide of managanese and sulphurie acid, the progress of research has shown that in a large proportion of cases, where organic matters are exposed to powerful oxidating agencies, this acid is among the products developed ; and hence several other processes have been devised for its preparation, on the large scale and in the laboratory. Of these the one generally in use consists, as is well known, in distilling a mixture in prescribed proportions, of peroxide of manganese, dilute sulphuric acid and starch or sugar.

The inconsiderable amount of acid yielded by this process, and its usually large admixture with other products, especially sulphurous acid, suggested to us, some time ago, the trial of bichromate of potassa, as a substitute for peroxide of manganese, and has since led us to a method of operating, which we think presents decided advantages over that in general use.

When bichromate of potassa, dilute sulphuric acid and sugar are mingled in proper proportions and in a proper order, a large amount of formic acid is developed, of which part passes off during the first violent reaction, and the remainder is separable by gentle distillation. Repeated experiments have convinced us that by mingling all the materials at once, before placing them in the retort, a comparatively small product is obtained, partly from its being volatilized by the high temperature attending the reaction,

and partly, we think, because more of the sugar is carried to its highest stage of oxidation in the forms of carbonic acid and water. We have therefore been led to another, and we believe, better mode of operating, of which the following details will serve as an example.

Introducing into a retort, capable of holding about one quart, 800 grains of bichromate of potassa and 10 cubic inches of water, we gently heat the mixture so as to dissolve the larger part of the bichromate. We then add 300 grains of powdered white sugar, and adjusting to the tubulure a perforated cork and pipette with gum-elastic bag for the gradual introduction of sulphuric acid, we slowly inject about 1 cubic inch of the latter upon the mixture. By regulating the addition of the acid and occasionally intermitting the slender stream, the violent reaction which ensues is prevented from occasioning any very great intumescence. During this stage of the operation, upwards of 2 cubic inches of a clear but feebly acid liquid passes over into the receiver. When the action has in a good measure subsided, we add 5 cubic inches more of water, and apply a gentle lamp heat, continuing the addition of the acid, by allowing it simply to drop from the pipette, until another cubic inch has been introduced. The liquid which now passes over is much stronger in formic acid than in the preceding stage, and the distillation may, without impairing the purity of the product, be continued until about 7 cubic inches have been received. By urging it much beyond this point sulphurous acid will be evolved.

One hundred grains of the liquid thus obtained is capable of saturating about seven grains of dry carbonate of soda. Its purity is such as to fit it for immediate use in illustrating the striking reactions of formic acid and the formiates. Thus—

1. On adding a small portion of it to a solution of nitrate of silver previously curdled by ammonia, and applying heat, the silver is promptly reduced with a lively effervescence of carbonic acid.

2. With a solution of bichloride of mercury, aided by heat, it causes a precipitation of calomel and the evolution of hydrochloric and carbonic acids.

3. Combined with soda it forms a white salt readily carbonized by heat and passing into carbonate.

4. It is not blackened by sulphuric acid, but the soda salt acted upon by this acid evolves carbonic oxide with brisk effervescence.

5. This salt heated with solution of nitrate of silver or nitrate of mercury, precipitates the metal with evolution of carbonic acid.

All these results are so prompt and striking as to evince but little contamination of the formic acid with other products.

On comparing this process with that commonly employed we are convinced of its superiority, first, on account of the exemption of the product from SO_2, and in a great degree from other impurities; second, from the much larger amount of formic acid obtained by it from an equal weight of the oxidising material, sulphuric acid and starch or sugar; and third, from the ease with which the action is controlled.

According to Liebig, (Chem. Org., p. 567,) 10 parts of starch, 37 parts of peroxide of manganese, and 30 parts of sulphuric acid, yield 3.35 parts of an acid liquid, of which 100 grains saturate 15 grains of carbonate of soda. This corresponds to 7.18 parts of liquid such as we obtain. We have thus by the old process 7.18 parts of liquid of equal acidity with our product, while the aggregate weight of the starch, sulphuric acid, and peroxide of manganese is 77. By our process we have about 1800 grains of a similar acid from 2100 grains of sugar, bichromate of potassa and sulphuric acid. In other words, *by the new process, we procure about nine times as much formic acid from the same weight of the three reacting materials, as by that hitherto in use.*

II. *On the preparation of Aldehyde and Acetic Acid by the use of the Bichromate of Potassa.*

In the process described by Liebig, (Chem. Org., p. 378,) and which is the one hitherto generally used for preparing aldehyde in the regular way, the product is obtained from the reaction of peroxide of manganese and sulphuric acid upon dilute alcohol. This operation furnishes a liquid which is so weak in aldehyde, and so mixed with water and formic ethers, and as we have found with acetic acid also, as to present the characteristic reactions only in a feeble degree, and to require two rectifications over chloride of calcium, before it can be used in forming the subacetylite or aldehydite of ammonia.

In the course of some experiments upon the reactions of bichromate of potassa and sulphuric acid upon alcohol, we have been led to a process which affords a larger and much purer product, and which is entirely under the control of the operator. The distinctive features of this method are the substitution of bichromate of potassa for the peroxide of manganese, and the peculiar mode of bringing the reacting materials together. In the use of the bichromate we have since found that we were anticipated by Prof. Kane, who, at page 922 of his Elements of Chemistry, recommends it as a means of obtaining a purer product, and specifies briefly the manner in which he conducted the process. As however his method is not noticed in other chemical works, and as our mode of proceeding and some of the results we have obtained, are, we think, not without novelty and interest, we deem them worthy of a brief notice in your Journal.

When alcohol is added to a strong aqueous solution of chromic acid in a retort, a very brisk reaction ensues, and upon applying a gentle heat there passes over a clear liquid, containing a considerable amount of aldehyde, with a faint trace of acetic and probably formic acids. The

presence of the aldehyde is readily shown by adding a few drops of the liquid to a solution of nitrate of silver previously curdled by ammonia, and then gently heating the mixture.   The oxide is speedily reduced, forming a brilliant metallic coating on the sides of the glass.

Substituting for the chromic acid of this experiment, a mixture of bichromate of potassa and sulphuric acid, and blending with this a quantity of common alcohol, the reaction is extremely violent, a large volume of carbonic acid is evolved, and the liquid which distils over, contains, with other products, *much aldehyde and acetic acid.*   To obtain either of these substances but little mingled with the rest, special attention must be paid to the proportions in which the bichromate, sulphuric acid, and alcohol are mixed, and to the order in which they are brought together.   Thus, in all our experiments, we found, that when *alcohol* is added *in small quantities at a time* to a mixture of the bichromate and sulphuric acid the distilled product is almost *pure acetic acid,* but when *sulphuric acid* is *slowly dropped* into a mixture of the salt and alcohol, the liquid which passes over contains little else than *aldehyde.*

This remarkable difference in the products is, we think, readily explained by the different intensity of the oxidating power in the two cases.   In the former, the alcohol, as it falls into the mixture of bichromate and sulphuric acid, being surrounded on all sides by free chromic acid, is carried rapidly through the lower stages of oxidation, corresponding to aldehyde and aldehydic acid, until by the addition in all of 4 equivalents of oxygen, and the elimination of 2 equivalents of water, it is converted into acetic acid.   In the latter case, the sulphuric acid, dropping slowly into the mixture of alcohol and bichromate, liberates but a small quantity of chromic acid at any one time, and thus limits the oxidation of the alcohol in great part to the first stage, or that of the formation of aldehyde.

From the observation of these facts, we were led, after a

number of comparative trials, to the following process for
the preparation of aldehyde.

Equal weights of powdered bichromate of potassa and
alcohol, sp. gr. 0.842 being placed in a capacious retort,
connected with a receiver and the usual means of refrigera-
tion, we adapt to the tubulure a pipette, charged with sul-
phuric acid, and whose stem reaches nearly to the surface
of the liquid, the top of the pipette being furnished with a
strong gum-elastic bag for injecting the acid into the mixture
beneath. We now slowly add the acid, taking care to
avoid excessive reaction, by sometimes allowing it merely
to drop spontaneously from the pipette, and again when
the action subsides accelerating its flow by pressure. At
this period of the operation, the heat evolved in the retort
is sufficient to carry over into the receiver a considerable
volume of the aldehydic liquid ; and, as much carbonic acid
is at the same time disengaged, the tubulure of the receiver
should only be loosely closed. Having thus added gradu-
ally a weight of sulphuric acid equal to about $1\frac{1}{2}$ times that
of the bichromate, we apply a gentle lamp heat and con-
tinue the distillation as long as the aldehydic liquid passes
over. When the reaction is most energetic, white fumes
are evolved, which, falling from the beak of the retort into
the receiver, are so dense that they may readily be poured
from the latter through a funnel into a narrow necked
bottle. These, when condensed, form a clear liquid con-
sisting chiefly of aldehyde.

By this process 1500 grains of bichromate of potassa and
the same amount of alcohol have on repeated occasions
yielded us about 8 cubic inches of a clear liquid, contain-
ing but slight traces of acetic acid or other extraneous
matters, and possessing all the characters of a nearly pure
mixture of aldehyde and water.

The product thus obtained is sufficiently rich in aldehyde
to exhibit instantly and strikingly all the characteristic re-
actions of that substance. It may, therefore, without recti-

fication, be employed in class-room experiments and in testing for silver.

A few drops of this liquid, added in a test tube to a solution of nitrate of silver previously curdled by ammonia, quickly converts the oxide into metallic silver, which attaches itself as a brilliant coating to the glass. In describing this characteristic property of aldehyde, Liebig and others appear to regard the *application of heat* to the mixture as necessary to the effect, (Chem. Org., p. 377.) We have found however that the aldehydic liquid of the above process, as well as the more concentrated aldehyde procured from it by distillation over chloride of calcium, causes a complete and brilliant reduction of the oxide of silver in a few seconds *at ordinary temperature*, and that the same effect results even *when the tube is immersed in snow*, but in this case the change requires two or three minutes for its completion.

Heated with hydrate of potassa the liquid becomes yellow, then of a deep reddish brown colour, and in a little while yields floating flakes of the characteristic *resin of aldehyde*.

On adding to the liquid an excess of caustic baryta in the cold, little or no action is manifested; but as soon as heat is applied, the mixture assumes an intense opaque yellow colour like that of chromate of lead, which by continuing the heat passes into a deep rich brown, as in the preceding experiment.

The proportion of aldehyde in the liquid as it comes from the receiver in the above process, is such, that to prepare *aldehydite of ammonia*, we may dispense with the two successive distillations from the chloride of lime directed by Liebig, and use the fresh product at once for this purpose. We therefore add to the liquid about half its bulk of sulphuric ether, and pass a stream of ammonia into the mixture. As the aldehyde becomes saturated, the compound in question falls in an abundant deposit of brilliant trans-

parent rhombohedral crystals. From this, as is well known, perfectly pure aldehyde is prepared by the reaction of dilute sulphuric acid.

In some experiments made to determine the delicacy of aldehyde as a test for oxide of silver, we obtained the following results:—

1. A solution of 1 part of nitrate of silver in 1000 of distilled water, when heated gently in a test tube with a drop or two of aldehydite of ammonia, formed a brilliant metallic pellicle on the inner surface of the glass.

2. A solution containing 1 part in 2000 produced the pellicle in distinct spots and not continuous as in the former case. At the same time the liquid became of a deep greenish purple colour, and although only one quarter of an inch thick was nearly opaque.

3. A solution of 1 part in 10,000 gave no adherent pellicle, but on continuing the heat for two or three minutes became strongly coloured, presenting a deep greenish purple by transmitted, and a dull olive by reflected light.

4. In a solution of 1 part in 20,000, the peculiar greenish purple tint was still quite decided, and even when the solution was diluted so as to contain only $\frac{1}{40000}$th of nitrate of silver this colour was very distinctly manifested after heating it sometime with aldehydite. Compared with the faint opalescence caused by the addition of chloride of sodium to the same solution, this effect of the aldehyde appeared to be the more striking of the two.

The peculiar purplish tint of the liquid, remarked in these experiments, is evidently due to the finely divided metallic silver held in suspension, and affords therefore a striking confirmation of the statement of Dupasquier, that not only gold, but silver and other opaque bodies, present this hue when greatly subdivided and viewed through a clear suspending medium, (Comp. Rend., No. 1, July, 1845.) It may be added that the same hue is developed when a very dilute solution of nitrate of silver is subjected to the reducing action of a formiate.

Allusion has already been made to the production of *acetic acid* in large amount by a modification in the above process.   For this purpose the powdered bichromate and the sulphuric acid in the proportion of about 2 to 3, are to be first mixed in the retort so as to develope a large amount of free chromic acid.   The alcohol is then introduced from the pipette as in the former case and with like precautions. During the violent action that ensues, much acetic acid passes over without the aid of external heat.   When the alcohol thus added amounts to about twice the weight of the bichromate employed, the action having subsided, we apply a gentle lamp heat and obtain a large additional quantity of the acid.   This we have found to be free from sulphurous acid and to contain little more than a trace of formic acid and aldehyde.

American Journal of Science and Arts.

ART. LXV.—NEW PROCESS OF REFINING AND PURIFYING ANIMAL AND VEGETABLE OILS AND GREASE.

By Peter Bancroft.

The nature of this invention consists in a process or processes of refining or purifying certain vegetable and animal oils, whereby they are better suited for lubricating the working parts of machinery; also in a process of refining or purifying tallow, to improve its lubricating quality; and likewise in a process of purifying and sweetening inferior descriptions of lard, and rendering them fit for human food, and applicable to all purposes for which the best Irish lard is now used.   The vegetable oils which the patentee proposes to refine for the above purpose are, the common olive oils,

Galipoli, Spanish, Portugal, Sicily, and such like qualtities
of olive oils.   It is well known that these oils, when applied
in their impure state to the working parts of machinery,
quickly become glutinous, act injuriously upon the brass-
work, and impede the proper working of the machine. This
effect is produced by the action of the air upon the impu-
rities contained in the oil, when the oil is exposed in small
quantities.   To remove this hurtful matter, the oil, when
heated to about 90° or thereabouts, is treated with a strong
solution of potash or soda, either in the state of a carbonate,
or made caustic by lime. The use of the alkali, in a caustic
state, is generally preferred, in consequence of its producing
less effervescence in the oil, and the operation being more
quickly finished than when the carbonates of either of the
above alkalies are made use of.   The specific gravity of the
alkali solution may be 1.2, or even stronger.   During the
time that the alkali is being added, the oil is to be kept in
a constant state of agitation to cause a thorough mixing. In
order to ascertain when the operation is completed, and a
sufficiency of the solution is added, the following test may
be used: Put a small portion into a glass bottle, or any
other convenient vessel, and add to it a solution of the alkali
in excess.   Shake it well, and then allow it to remain at
rest for a quarter of an hour, or until the alkali has settled
to the bottom of the vessel.   Should the alkali settle quite
clear, without causing a thick deposit to take place, the oil
is sufficiently refined; if it does not remain clear, but carries
down with it a thick soapy matter, more alkali is added to
the oil under operation, until, on further trial, this effect
takes place.   The quantity of alkali required will depend
entirely upon the quality of the olive oil operated upon. In
practice it will be found that some qualities require as much
as 8 per cent. of solution of specific gravity 1. 2, while other
qualities do not require more than $3\frac{1}{2}$ per cent.   When the
above operation is completed, the oil is allowed to remain
at rest for twenty-four hours, or until such time as the thick

soapy matter, formed in the oil by the alkali, has subsided; the supernatant oil may then be run off and passed through a filter.   It is stated, that oil thus operated upon will not tarnish the most delicate brass work, nor will it become thick and glutinous upon exposure to the air.   The animal oil which the patentee prepares for lubricating purposes is the oil expressed from lard; and the process of refining this oil is exactly similar in all its details to that described above.

Before explaining his mode of purifying tallow, so as to make it fit for lubricating, the patentee remarks that all tallows are not applicable, those suited to the purpose being such as are termed in commerce Y. C., of light yellow colour, and sweet or good home-rendered tallow.   Tallow of such description is melted by steam or other heat, and when the tallow has become fluid, but before it has become much heated beyond its melting point, a strong solution of potash or soda, either caustic or in the state of a carbonate, and of specific gravity 1.2, or thereabouts, is added, the tallow being kept in constant agitation during the introduction of the alkali.   Upon the first introduction of the alkali solution a very thick soapy matter is precipitated; the operation is completed when, upon a further addition of the alkali, this effect ceases to be produced ; the tallow is then heated to about 180° or 200° of temperature, after which it is allowed to rest for twenty-four hours or more, according to the quantity operated upon and the heat of the weather.   When it is perceived that the tallow in cooling is becoming slightly opaque, it is run off into casks, and while cooling must be well stirred to prevent it from granulating.

The process of refining and sweetening American and inferior lard is as follows: In using American lard, it is, in most cases, too soft and oily; it is, therefore, advisable first to extract a portion of the oil, by pressure; the lard is then melted by steam or other heat, and a strong solution of potash or soda, or carbonate of these alkalies, is added, as before, with constant agitation of the lard.   It should be ob-

served, that a weak solution of the alkalies is to be avoided, and that the stronger or denser they are made, the more perfectly will they separate the impurities from the oils and fats. The matter, which is precipitated in the refining of the above oils and fats may be used in the manufacture of soap; the nature of the soap depending upon the alkali made use of. If it is required, an inferior oil or fat may be recovered from the deposit formed by neutralising the alkali by an acid. For this purpose the sulphuric acid, diluted with water, may be employed.

The patentee states that he is aware of the alkalies, potash and soda, having been used and recommended for the purification of oils and fats, but to the best of his belief they have never been employed for the purification of the oils and fats mentioned above, when those oils are refined for the purpose of being applied as described. He therefore claims the refining and purifying of olive oils, lard oil, tallow, and lard, for the purposes already mentioned, by treating them as herein described. —*Newton's Journal.*

ART. LXVI.—ON THE INFLUENCE OF PROTOXIDE OF NITROGEN UPON VEGETATION.

By M. Vogel, Jun.

It is generally admitted that nitrous oxide is not capable of sustaining life, although a candle blown out is relighted, and burns with more brilliancy in this gas than in atmospheric air. The rapid combustion of the candle is owing to the easy decomposition of this gas at a high temperature —a decomposition which cannot be effected by the lungs

in respiration; while air, which is but a simple mixture of oxygen and nitrogen, readily parts with its oxygen in the act of respiration, I have made some experiments to ascertain the influence of the protoxide of nitrogen on vegetation. The gas which I employed was obtained by heating perfectly pure nitrate of ammonia. I placed some seeds of cress, scattered over a moistened sponge, in a white glass flask, filled with protoxide of nitrogen. The seeds were introduced into the flask under water, and all atmospheric air removed as much as possible from the pores of the sponge by gently pressing it. A sufficient quantity of water was left in the flask to produce germination; the vessel was then closed hermetically.

For the sake of comparison, I placed in a flask filled with air another sponge covered with seeds of cress. In the course of a few days the seeds in the last vessel were developed, and began to form leaves. The case was different with the seeds in the protoxide of nitrogen; there not the least trace of the development of the germ could be observed; nevertheless, the seeds had swollen, and were covered with a mucous layer, without having experienced any other change which could lead to the supposition of their having germinated. After two weeks I removed the sponge with the seeds from the flask; but as soon as they were exposed to the air they began immediately to germinate, proving that during their stay in the protoxide of nitrogen they had not lost the power of germinating, while they do not germinate when they have been in contact for some time with several other gases.

The gas in which the seed had been kept for two weeks had experienced no alteration; it did not contain the least trace of carbonic acid, and still set light to the glowing wick of a candle.

To ascertain the influence of this gas on plants already developed, I introduced into a flask filled with protoxide of nitrogen a sponge covered with plants of cress perfectly

formed, observing the precautions mentioned above; for two days the young plants continued unaltered, but on the third they acquired a yellow colour, and towards the end of the week they drooped.   Exposed to the air, they re-assumed, in a few days, their verdure and erect position.

It must be remarked, that the above experiments were made not only upon seed, but also upon the plants, and that the oxide of nitrogen was exposed to the direct rays of the sun, and kept in the shade, but that in neither case decomposition of the gas was effected.—*Chem. Gaz. from Journ. de Pharm.*

ART. LXVII.—ON THE EXAMINATION OF BALSAM OF CO-
PAIBA. By M. OBERDOFFER.

BALSAM of copabia·has latterly produced considerable embarrassment among druggists with respect to the necessity of its being completely soluble in alcohol.   We have often heard the importers declare, that they would no longer deal in this article, unless some new mode of examining it was resorted to.   This circumstance induced me, at the request of a respectable mercantile house in Hamburgh, carefully to study the subject again.

If we compare the different kinds of balsam of copaiba, which are met with in commerce, both old and new samples, we shall find a well-marked difference.   Formerly, we usually obtained a perfectly transparent balsam, thick, and completely soluble in alcohol, forming a transparent soap with caustic potash, and leaving behind a brittle resin after having been boiled a long time in water.   It was seldom met with in a more fluid state, frequently it was more firm

in its consistence, more thickened by age, and when agitat-
ed with a solution of caustic potash, the latter caused the
separation of a transparent soap, with greater difficulty,
and only after the lapse of several days. It was some-
times even necessary to employ a slight degree of heat, so
that it has frequently been looked upon as adulterated,
notwithstanding its complete solubility in alcohol. This
last idea originated at a time when balsam of copaiba was
at a high price, and, as old castor oil was to be obtained at
a much cheaper rate, it was frequently employed to adul-
terate the balsam. This adulteration only became manifest
by the semi-fluid residuum left behind, after the evapora-
tion of the pure essential oil, and the pure thickened bal-
sam, considered as adulterated by a mixture of castor oil,
was that alone which justified the suspicion, by this
method.

Latterly, the balsam, principally brought from Mexico
and the West Indies, frequently appears in commerce in a
very fluid state, and occasions the complaints in question.
The cause of this difference can only be attributed to its
being newer, or less dense, or to adulteration, but in most
cases to the first of these causes.

M. Gerber, in 1829, examined various specimens of bal-
sam of copaiba; he found—

	Recent balsam.	Old balsam.
Essential oil	41.00	31.70
Hard yellow resin	51.38	53.68
Soft brown resin	2.18	11.13
Water and loss	5.44	4.10

M. Stockhardt, last year, directed our attention to an
extremely liquid balsam which had all the appearance of
good balsam; two specimens of which, obtained from dif-
ferent sources, left, after the complete evaporation of the
essential oil, the one 42, the other 43.5 of brittle yellow re-
sin; while, according to M. Gerber, the resent balsam yield-

ed 53.38, and the old sample 64.78 of dry resin. A fluid balsam, whose properties I am now studying, only left, after having been boiled a sufficient time in water, 40 per cent. of a brittle and perfectly dry resin.

Having been for a length of time, accustomed to a thick balsam, we receive less favourably a liquid balsam, which is also not so well adapted to the preparation of pills, for which purpose it is at present most frequently employed, along with wax or calcined magnesia ; and to this we must add another circumstance, namely, that the liquid balsam usually produces a clouded mixture with pure alcohol, and thus, according to the rule laid down in the Pharmacopœia, which usually requires complete solution in this liquid, it has been declared impure.

The complaints of the druggists have been sufficiently numerous and well-founded to render it necessary once more to examine the action of alcohol on the liquid balsam.

Comparative analysis has shown a difference of from 32 to 54 per cent. in the proportions of the essential oil, and looking at it in this light, if the fluidity only depends on this circumstance, the liquid balsam may be considered as more active than that which is thickened.

If we except the trial by prolonged ebullition, or by the evaporation of the suspected balsam, in which case the brittle resin that remains is the only certain proof of the absence of a mixture of the fat castor oil, any other isolat- ed trial by reaction is seldom sufficient for a preliminary proof. So that how good soever the plan of agitating it with a solution of caustic alkali may be, the age of the bal- sam and the amount of agitation contribute to the more or less rapid and complete separation of the transparent soap. Small variations, which occur in the case of the thick balsam, particularly, may easily be the cause of mistakes as to the purity of the balsam. But the action of alcohol is also in- sufficient, because it gives no proof of the presence of cas-

tor oil, and small quantities of fat oils may even escape detection.

In addition to this, a great variety of samples of balsam of copaiba introduced into the market (not all) also produce a clouded mixture with pure alcohol, without our being able to consider them as impure. Still there is always this difference between this effect and that produced by fat oils; in this case the mixture, which first becomes rather milky, by agitating it, immediately allows the separation of light flakes, which at first float on the surface and afterwards are deposited at the bottom of the vessel, becoming hard by degrees, but still in small quantity, in comparison with the balsam examined; after their separation by filtration, and being well washed with alcohol, they remain, under the form of a white, dry, and very brittle substance.

It is insoluble both in hot and cold alcohol, ether, and water, but it is readily and completely dissolved in petrolium. It easily melts when heated, and forms a yellowish-white resinous mass, which, on the application of more heat in a platinum spoon, becomes brown and burns, giving out a smell of caoutchouc and a clear flame, and leaving no residue. This substance, therefore, comports itself like a peculiar kind of resin, resembling that portion of mastic which is insoluble in alcohol, and it may be considered as an accidental principle in the new balsam; because all new balsams do not contain it, as I have satisfied myself by the examination of different samples brought directly to this city from Para and other countries by the *New York*. Out of three of these samples which were equally fluid, two had the pale yellow colour of balsam, but the third was considerably browner, like dark-coloured Xeres wine. All three were perfectly clear and had a strong smell, leaving, after boiling, from 40 to 42 per cent. of a dry resin. Mixed with two parts of a solution of caustic alkali, all three specimens, after frequent and strong agitation, separated a transparent soap. The brown sample gave, in pure alcohol-

a perfectly transparent solution, without the least cloudiness. The two others, on the contrary, separated whitish flakes of a resinous nature; like that noticed above, their quantity was small, but tolerably equal.

If we seek the cause of this difference in their comportment, the explanation appears easy, by considering the age and state of vegetation of the plant. The multiplicity of species of the trees that yield copaiba may also cause a difference. In all cases where a cloudiness of this nature is produced by alcohol, particularly when the balsam is new and fluid, it cannot be considered as caused by adulteration; so also the results to be required from a trial by pure alcohol (which on the other hand easily demonstrates the presence of fat oils and consequently ought not to be completely abandoned) ought to be modified in the following manner:—By intimate mixture with this liquid a deposit of a fluid fat oil ought not to be quickly formed, while a light flocculous cloud ought not to induce you to reject the yellow balsam, after it has in other respects exhibited a normal state, free from adulteration.—*Chem. from Journ. de Pharmacie.*

ART. LXVIII.—ON THE RED COLOUR OF THE PROTOSALTS OF MANGANESE. By A. Völker.

MANY chemists have ascribed the red colour of the protosalts of manganese to the presence of a higher oxide, and have described various methods for removing it. Thus Trommherz and Brandes advise precipitating a tolerably strong solution of a rose-coloured protosulphate of manga-

nese by carbonate of potash, dissolving the washed proto-
carbonate in sulphuric acid, precipitating it again, and re-
peating this operation until a colourless solution is obtained.
On each solution in sulphuric acid a portion of the intermix-
ed higher oxide is said to be converted into protoxide and
oxygen, and finally to disappear entirely. Since the proto-
carbonate, on washing in the air, is readily oxidized higher,
it is evident that the frequent precipitation is more injurious
than advantageous. I shall subsequently show that, by one
solution of the protocarbonate of manganese in sulphuric
acid, the so-called colourless salt is obtained, when a suffi-
cient quantity of concentrated sulphuric acid has been em-
ployed.

According to Brandes, the colourless salt is obtained when
the pulverized sulphate is boiled in spirit or æther, and then
dissolved in water, or when its solution is boiled with some
sugar. According to Brandenburg, the colourless salt is
obtained on heating to redness manganese with English oil
of vitriol, and the red salt with fuming oil of vitriol. Gmelin,
on the contrary, always obtained a coloured salt by igniting
manganese with fuming or monohydrated sulphuric acid,
which, on being heated to redness and again dissolved, af-
forded a red solution, which could not be decolourized by
sulphurous acid or continued boiling with sugar, even on
the addition of sulphuric acid. He thence concludes that
the red colour of the protosalts of manganese cannot be as-
cribed to the presence of a higher oxide. Berzelius enter-
tained the same view, and supposes the difference of colour
to depend on isomerism.

I have repeated all the above experiments, but without
succeeding in obtaining a perfectly colourless salt. When
protocarbonate of manganese, which has been washed and
exposed to the air, is heated with dilute sulphuric acid, a very
red solution is obtained, while a brown powder remains un-
dissolved; when, on the other hand, concentrated sulphuric
acid is employed, a colourless solution is obtained, which

on cooling solidifies to a tissue of colourless crystals. It
being known that salts of manganese are very readily more
·highly oxidized in the presence of a superoxide and free
dilute acid, as for instance peroxide of lead and dilute
nitric acid, I assured myself that the red solution ob-
tained by dissolving protocarbonate of manganese in dilute
sulphuric acid, owes its red colour to an admixture of a
higher oxide of manganese, for it is instantly decolorized by
a few drops of sulphurous acid or an organic substance. It
appeared to me beyond all doubt that the red colour was to
be ascribed to a higher oxide, and that protoxide of manga-
nese, perfectly free from oxide, yielded colourless salts; but
in preparing a larger quantity of the colourless salt, by dis-
solving pure protocarbonate of manganese, I obtained
crystals which singly appeared colourless, but in mass ex-
hibited a decided, though faint reddish tint. This slight
colour could not be removed either by sulphurous acid, or-
ganic substances or sulphuretted hydrogen; it could there-
fore not be ascribed to the presence of a higher oxide. The
protocarbonate of manganese had been prepared with care,
and tested as to its purity previous to solution in sulphuric
acid; the slight reddish tint could therefore not be owing to
any foreign substance. I am inclined to regard this faint
colouring which the protosalts of manganese exhibit, and
which cannot be removed by sulphurous acid, sulphuretted
hydrogen, or any other reducing agent, as peculiar to the
protosalts of manganese.

The most usual cause however of the red colour of the
protosalts of manganese, is owing to the presence of cobalt.
In preparing the colourless salt, by treating commercial man-
ganese with an excess of concentrated sulphuric acid, I ob-
tained on dissolving the salt a solution, which even when
largely diluted had a rose-red colour, which could not be
made to disappear by sulphurous acid, or any other reducing
agent. I was long in doubt respecting this red colour, but
some experiments soon showed me that it arose from cobalt;
and in fact nearly all the kinds of manganese which I have

examined, from the most different localities, contained more or less cobalt, some in such large quantity that it might be advantageous to obtain cobalt from them for technical purposes. I likewise found cobalt constantly present in all the red coloured salts of manganese, and the more of it the deeper they were coloured. This explains why the so-called colourless salt is obtained by heating the protosulphate of manganese to redness, since the sulphate of cobalt is readily decomposed at a red heat; it further explains why some persons have obtained colourless crystals from coloured solutions by the application of reducing substances, while others obtained coloured salts; the latter had probably employed material containing cobalt.

The separation of cobalt from manganese is readily effected in the following simple manner: Sulphuret of ammonium, diluted with water, is carefully added in drops to the somewhat dilute solution of the salt of manganese containing cobalt, agitating constantly as long as a black precipitate is produced. The cobalt is thus completely precipitated; what first falls contains not a trace of manganese; but to be sure of removing the whole of the cobalt, it is advisable to throw down a little of the manganese with a slight excess of sulphuret of ammonium.

I am not able to confirm the statement met with in some works, that colourless salts of manganese are precipitated of a white colour by sulphuret of ammonium; at least I always obtained the characteristic flesh-coloured precipitate. The cause of this statement is undoubtedly to be ascribed to the bad nature of the sulphuret of ammonium. Sulphuret of ammonium which has been kept for a long time, and contains, owing to the frequent opening of the bottle, much carbonate of ammonia, precipitates protoxide of manganese from dilute solutions of a white colour. With ferrocyanide of potassium I obtained a white precipitate, which experienced no change even after long keeping, while the precipitate produced by ferrocyanide of potassium in the red

coloured salt containing cobalt, appeared after some time reddish-brown.

With respect to a method which has been proposed for separating quantitatively manganese from cobalt, I will cursorily observe that protochloride of manganese, according to my observation, is perceptibly volatilized when heated in a current of hydrogen gas. The hydrogen acquires the property of burning with a white luminous flame, which deposits brown stains of oxide of manganese on a cold piece of porcelain. Water through which the gas was passed gave distinct traces of protochloride of manganese. The salt could not have been carried over mechanically, as it was used in the fused state. I have moreover obtained the protochloride of manganese sublimed in colourless, extremely light laminæ; the heat required, however, is very great.—
Chem. Gaz., from Liebig's Annalen.

ART. LXIX.—ON THE ACTION OF FERROCYANIDE OF POTASSIUM ON THE TARTRATE AND CITRATE OF IRON; AND OF TARTARIC ACID SIMULTANEOUSLY WITH AMMONIA, ON PRUSSIAN BLUE.

By M. Ch. Calloud.

The ferrocyanide of potassium, of which the action on all the salts of iron with mineral acids is so well known and so well characterized, presents, in its contact with some salts of iron with organic acids, differences of action which are modified according to the state of neutrality of these salts, in giving products which do not appear to be isomeric with those of the inorganic iron salts. In examining the action of the ferrocyanide of iron on the tartrate and citrate

of iron, some remarkable reactions are observable which are not common to all the salts of iron, and which, as far as I know, have not been previously mentioned.

The neutral tartrate of iron, and the neutral citrate, are precipitated by the alkaline ferrocyanides, as all others of the per salts of iron, but the precipitate formed has not all the appearances of ordinary prussian blue, and its colour is often very much modified, without arising from an excess of one of the reacting salts.

The tartrate of iron with excess of tartaric acid, on the contrary, is not precipitated by a solution of ferrocyanide of potassium, and the *solution* becomes immediately *blue* and remains limpid. After the lapse of a long time, a slight precipitate occurs, which is not so dense as prussian blue; the liquid remaining meanwhile *clear* and *blue*.

This *blue* liquid, obtained by mixing the solution of tartrate of iron with *excess of tartaric acid* and the ferrocyanide, when evaporated to dryness, does not change its properties; it is concentrated by heat without decomposing, the product of the evaporation remains a beautiful *deep blue* and redissolves in water.

Ammonia *destroys* the blue colour of the above reaction. This decoloration, effected by ammonia on the *soluble blue*, (of the acid tartrate of iron and ferrocyanide) is explained by the immediate formation of the double tartrate of iron and ammonia, which, as we already know, for the other double tartrate of iron and the alkalies is without action on the double cyanide of iron and potassium.

The citrate of the peroxide of iron with excess of citric acid, and the ferrocyanide of potassium, form a *soluble blue*, equally decomposable by ammonia.

I have not essayed the action of the ferrocyanide of potassium, except on these two salts; but it is probable that it applies equally to all the salts of peroxide of iron with organic acids.

Prussian blue precipitated from a salt of the peroxide of

iron, (as sulphate, nitrate, or chloride,) is not dissolved by
tartaric acid only, and is not at all modified; but on adding
ammonia afterwards, the *blue* becomes white, presenting
the intermediate phases of coloration according to the quan-
tity of ammonia added.   Thus it becomes *violet-purple,
amethyst, rose, pale rose*, and then *white*.   This *white pre-
cipitate* becomes blue by the addition of a new quantity of
tartaric acid, and returns to *white* by ammonia.   Exposed
to the air and under water, it remains white, but becomes
again *blue* by drying.

The interesting point of this reaction is, that it is alto-
gether according as you throw on the prussian blue, a ready
made solution of tartrate of ammonia, or tartaric acid, and
then ammonia afterwards.   In the first case, the prussian
blue is dissolved, and the solution has a magnificent *violet*
colour; in the second, the precipitated prussian blue does
not dissolve, and the *blue* becomes immediately *white*.

The vegetable salt also modifies the prussian blue, but it
does not totally change the colour even when employed in
excess.

The property enjoyed by tartrate of ammonia of dissolving
prussian blue, was first announced by M. Monthiers.   This
fact I had already personally ascertained, and of which I
had taken a note, proposing to myself to examine it at my
leisure.—*Journ. de Pharm. et de Chim.*

ART. LXX.—ON THE EMPLOYMENT OF CHLORINE, AND HY-
DROCHLORIC AND SULPHURIC ACIDS, FOR THE PRE-
SERVATION OF LEECHES.

M. Roder, pharmacien at Lenzburg, had seen a great
number of leeches perish in the course of the year 1845,
by an epidemic; all the means of preservation known, such
as charcoal, honey, sugar, etc., having failed. He had then
recourse to chlorine; to 48 ounces of water he added three,
four, five drops or more, of solution of chlorine; put the
leeches in it, and left them for ten or fifteen minutes, when
the chlorine water was replaced by pure water; this treat-
ment saved the leeches without the necessity of renewing
it.

The same end would probably be attained by the ad-
dition of some drops of hydrochloric acid to neutralize the
ammonia which has been developed, and which is, as every
one knows, a dangerous poison for leeches; in fact, they were
preserved very well in water acidulated by earthy turf,
which contains a small quantity of crenic acid, and perhaps
acetic acid. The employment of ordinary sulphuric acid,
very diluted, (five or six drops to twelve ounces of water,)
has equally proved beneficial in another case of the epi-
demic of leeches. The acidulated water was replaced by
pure water, and every trace of the disease disappeared
completely. *Journ. de Pharm. et de Chim.*

29

EXTRACT FROM THE MINUTES OF THE BOARD OF TRUSTEES.

At a stated meeting of the Board of Trustees of the Philadelphia College of Pharmacy, held 12th month 21st, 1846, the chairman announced the death of A. J. L. Duhamel, a member of this Board, who died of a pulmonary disease, this morning at about 6 o'clock, in the 33rd year of his age

The following minute, which was prepared by the Secretary on the occasion, was approved, and ordered to be recorded.

The Board of Trustees having been called to mourn the death of their late esteemed fellow member, Augustine J. L Duhamel, have regarded an expression of their sorrow on the occasion, and their respect for his memory, as called for at their hands.

He became a graduate of our College in 1834, and a member in 1840, and during the last five years has been one of the most zealous and useful members of this Board His talent for scientific research, and thorough acquaintance with Pharmacy and its kindred sciences, have been exhibited in numerous contributions to the American Journal of Pharmacy, and in the discussions of our pharmaceutical meetings.

Though possessed of a retiring disposition, his talents were not the less appreciated by his associates, and he was not without frequent evidences of their confidence and regard. His early death has terminated a career of usefulness and honour, and thrown over his survivors in this Board a feeling of unfeigned sorrow. He will long be remembered by them as an accomplished apothecary, and an amiable and esteemed associate in their labours.

Extracted from the minutes.

EDWARD PARRISH, *Secretary.*

NECROLOGY.

American Pharmacy has lost an able and experienced advocate in the person of Augustine J. L. Duhamel, who departed this life on the 21st ultimo, in the thirty third year of his age; and we, who were acquainted with him, and amongst whom he has grown up, have especially to mourn the loss of a valuable member of our profession, and a worthy fellow-citizen, thus cut off at the height of his career, when the rewards of a steady pursuit of professional duty were commencing to flow in upon him, and the prospects of the future were opening favourably on his path.

A. J. L. Duhamel was born in this city, though of French descent; his father, who survives him, being a native of Bayonne in France.

In the year 1829, he commenced the study of pharmacy with Elias Durand, under whose guidance he attained to that proficiency in pharmaceutical knowledge and practice, which marked him as a professional man; and in the employ of his preceptor he devoted ten years of his majority.

In the spring of 1834, after accomplishing the courses of study prescribed by the Philadelphia College of Pharmacy, he applied for and received the diploma of that Institution, which declared him to be a Graduate in Pharmacy. From that period almost to his decease, the continued interest felt by him in his favourite pursuit, has been deeply graven on the pages of this Journal, in the numerous contributions to its volumes which owe their origin to his pen. In this field his loss will be sensibly experienced, by the cessation of of his labours as a contributor.

His papers number thirty four in all, scattered through twelve volumes of the Journal, and are eminently practical in their character. His inaugural essay on the preparations of iodine, published in 1835, extended through seventeen pages, and contained much that was new and interesting at that period.

Seven of his essays, under the title of " Pharmaceutical Notices" exhibit a great variety of facts, chiefly relative to new formulæ, or suggestions for the improvement of old

ones; and perhaps no portion of his investigations were more acceptable to his brethren, or marked with more benefit to the profession, than this series of unpretending communications.

Two of his contributions relate to Boullay's filter, and method of displacement, and we believe that he was the first on this side of the Atlantic to comment on this valuable improvement in pharmaceutical manipulation.

His other papers embrace a variety of subjects, generally having a practical tendency, often original, though frequently composed of commentations on the labours of French writers, with the language of which he was familiar; an accomplishment that enabled him on very many occasions to lend his aid in the way of translations.

In 1840 he became a member of the Philadelphia College of Pharmacy, and shortly afterwards was chosen by the committee of the College, then engaged in revising the Pharmacopœia, as one of their three assistants, which duty he performed in a creditable manner. About this period he was elected a member of the Board of Trustees, of which body he continued a member until his death.

The character of his mind, though not marked with striking originality, was particularly well suited for his profession; and in viewing subjects he was influenced more by the practical and useful, than by any abstract scientific interest they might possess. His acquaintance with English literature and general history was of no mean extent, and his familiarity with the French language gave him access to the writers of that country, of which he extensively availed himself.

His mild and courteous demeanour marked him as a gentleman, and in his intercourse with society the impressions left on the minds of his associates, were altogether in favour of the goodness of his heart. May we who are left emulate his virtues, and endeavour by increased industry to fill up the professional hiatus occasioned by his early and lamented death.   W. P. Jr.

MISCELLANY.

On the Employment of Guaiacum-resin as a test. By G. OSANN.—According to Schönbein, guaiacum-resin is coloured blue by ozone; the same alteration is also effected by chlorine. This circumstance can be turned to account for detecting very feeble electric currents, by passing them through a mixture of a few drops of tincture of guaiacum and common salt. The guaiacum solution, however, should always be recently prepared.

The solution of guaiacum is extremely sensitive towards perchloride of iron, so that when present in so small a proportion as not to act upon tincture of galls, it still colours the solution of guaiacum blue.—*Chem. Gaz. from Poggendorff's Annalen.*

A new mode of preserving Animal Substances. By the ABBE BALDAUMIK.—The Abbé Baldaumik, preparator at the Museum of Natural History at Vienna, has succeeded in rendering animal substances as hard as stone. To effect this he immerses them in water, holding in solution bichloride of mercury and hydrochlorate of ammonia. Substances that have remained immersed in this liquid for some time acquire the hardness of stone, may be polished, resist the hammer, have an angular fracture, and give out a metallic sound when struck. They preserve their natural colour, and require no further care after they are taken out of the bath.—*Chemist, from Archiv. de Pharm.*

On the Preservation of Water. By M. PERINET.—M. Perinet, ex-professor of the *Hopital Militaire d'Instruction*, has succeeded in preserving water in a sweet state by placing a kilogramme and a half of black oxide of manganese in each cask of water containing 250 litres. He has kept this water for seven years in the same barrels, and exposed them to various temperatures; at the end of that time he found it as limpid, free from smell, and of as good quality as at the beginning of the experiment.—*Ibid, from Journ. de Chim.*

Mode of dividing Plates of Zinc. By M. WAIDELE.—It is frequently a subject of great difficulty to divide plates of cast zinc for use in galvanic batteries. The following is a simple and ready method of accomplishing this end. Grease the plate over by means of a rag and a little tallow; with a pointed instrument draw a line in the required direction of the cut, so as to remove the grease from that spot, and penetrate slightly into the metal; pass a little dilute sulphuric acid over this line by means of a feather, and then let a drop or two of mercury fall on the same spot; the zinc soon becomes amalgamated in the direction of the line, and through its entire thickness. A slight blow, properly given, will cause it to break.—*Chem. Gaz. from Revue Scient.*

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Preparation of Ferridcyanide of Potassium. By DR. RIEGEL.—It has recently been recommended, in order to prevent the formation of the well-known yellowish-green body in the preparation of the red prussiate of potash, to pass the chlorine obtained from 50 grms. salt with manganese and sulphuric acid into a solution of 50 grms. of the yellow ferrocyanide in 200 grms. water. The author could not obtain any satisfactory result by this method; he therefore recommends, when the formation of the body cannot be avoided, to allow the liquid to evaporate in a very tall vessel, when the green body is constantly deposited at the bottom of the vessel, and can readily be removed mechanically by repeated recrystallization.—*Ibid, from Jahrb. für Prakt. Pharm.*

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Manufacture of Lucifer-Matches without Sulphur. By R. BÖTTGER.—The author recommends the following composition for the preparation of lucifer matches:—4 parts phosphorus, 10 parts nitre, 6 parts gelatine, 5 parts red lead or ochre, and 2 parts smalt. The gelatine is soaked in a small quantity of water for 24 hours, the jelly conveyed into a mortar and warmed until it has melted, when the other ingredients are introduced, constantly applying heat, but not above 167°, until the whole forms a perfectly homogeneous mass, which cannot be drawn out into threads. To make lucifer-matches with this mass, which continue to burn after ignition, without any coating of sulphur, the extremities of the matches are held for a few seconds against a plate of iron, in order to carbonize them superficially; they are then dipped into very hot melted wax, the excess shaken off with a jerk of the arm, and dipped into the above composition.—*Ibid, from Phys. und Chem. Vorlesung.*

Artificial Marble.—M. Bouisson has taken out a patent for preparing artificial marble from gypsum, which is to be cut of the required size, placed in a metallic trough in a furnace, and kept at the temperature of 90° for some time, after which a solution of alum in boiling water is poured upon it, and a gentle heat continued for some length of time, the water being renewed as it evaporates. For a block 6 feet long and 2 feet in the other directions, exposure for 5 hours before the addition of alum solution, and 72 hours after, suffices to impregnate the plaster. The strength of the alum solution is 1 lb. to 6 quarts of water. It is always well to cut the plaster in the form required before hardening it. By introducing colouring matter into the solution various tints may be obtained.—*Ibid, from Journ. de Chem. Med.*

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On the Action of Oxalic Acid upon the Blood and Dead Tissues of the Animal Body. By DR. LETHEBY.—It has been stated by Dr. Coindet, Dr. Christison and others, that oxalic acid does not appear to have any corrosive action on the stomach like the mineral acids. Dr. Letheby, however, remarks that these statements are opposed to the observations which he has made. In every case which he had examined of poisoning by oxalic acid, the stomach after death was found to be so completely corroded that it would not hold together. Numerous experiments were made with various animal tissues, such as submitting skin, stomach, intestine, muscle and tendon to the action of oxalic acid of different strengths. After standing about 12 or 14 hours at a temperature of 60° F., it was found that the cellular and mucous tissue of each underwent either complete solution, or else was so softened that it broke down under the pressure of the thumb and fingers; the albuminous and muscular tissues were also softened, and looked as if they had been scalded. The solutions were then filtered and evaporated in a water-bath; by which means a gelatinous-looking mass was obtained, and the oxalic acid had so entered into combination with the gelatine that it could not be dissolved out in its usual manner by the action of cold alcohol.—*Chem. Gaz.*

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On the Preparation of Caustic Baryta. By DR. E. RIEGEL.—The reduction of the carbonate of baryta with one-tenth charcoal and some tragacanth-mucilage, yields a baryta which constantly contains some charcoal, and most frequently also undecomposed carbonate of baryta. It may be obtained more pure by heating to redness the nitrate in a porcelain crucible; but then the heat must be long applied, which renders the preparation rather expensive. According to Vogel, a fourth

part in weight of concentrated solution of caustic potash is added to a boiling concentrated solution of sulphuret of barium, when the hydrate separates on cooling in crystals, which may be purified by recrystallization. Hydrate of baryta may be obtained quicker, but less pure, by decomposing a solution of sulphuret of barium with oxide of copper; the ley generally contains a slight trace of copper.

A very simple and cheap method consists in heating a concentrated solution of sulphuret of barium with a sufficient quantity of peroxide of manganese, until reagents indicate no sulphuretted hydrogen in the liquid, and then filtering as quickly as possible. On the cooling of the hot concentrated solution, the hydrate of baryta separates in colourless, transparent, four-sided, and flattened six-sided columns, with four terminal surfaces, and the filtered ley may be used as barytic water. The author could not observe the formation of any hyposulphite of baryta. On adding a few drops of basic acetate of lead to the solution of sulphuret of barium, which had been heated with sufficient peroxide of manganese, a beautiful brick-red precipitate was formed, which however was not examined, and in subsequent experiments could not be again obtained.—*Ibid, from Jahrb. für Prakt. Chem.*

Purification of Hippuric Acid. By DR. A. BENSCH.—The fresh urine of the horse, that passed in the morning being best, is evaporated in a water-bath to one-eighth of its volume, precipitated when cold with muriatic acid, the hippuric acid collected on a strainer, strongly pressed, and treated with 10 times its weight of boiling water and excess of milk of lime. The mixture is strained, pressed, and the fluid treated with solution of alum until the alkaline reaction has disappeared; it is then allowed to cool to 104° F., and solution of bicarbonate of soda added as long as a precipitate ensues, strained and pressed, and the clear fluid precipitated with muriatic acid. The precipitated hippuric acid, after having been washed and pressed, is dissolved in boiling water, an ounce of animal charcoal added to each pound of moist hippuric acid, the boiling liquid filtered through paper, and perfectly white hippuric acid is thus obtained. The precipitates produced are readily separable from the liquid by a linen cloth, not passing through the latter when pressed; hence the purification may be accomplished in a few hours, provided the temperature, when the bicarbonate of soda is added, does not exceed 104° F.—*Ibid, from Liebig's Annalen.*

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